TraffiClair

PRODUCT CATALOG

DYMEC
AMERICAN INDUSTRIAL
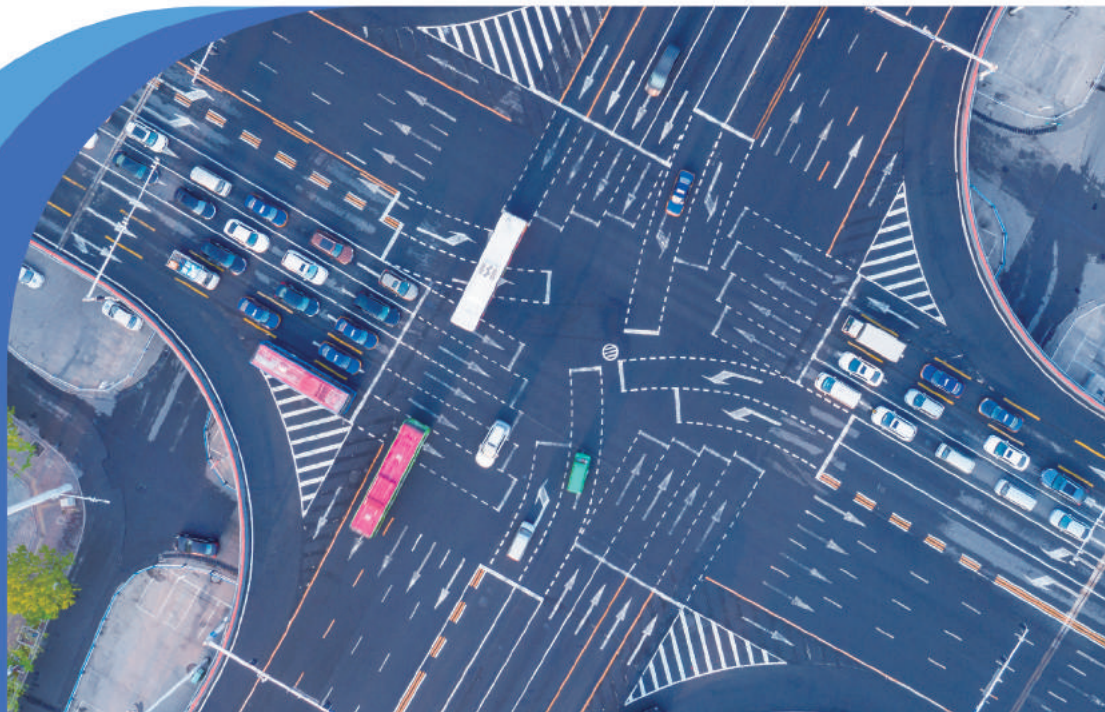
Content

ClairBox-R AI Box

Traffic AI Box with AI Video Processing and Signal Optimization

Video Processing

Scheme Optimization & Generation

Distributed Control Network Based on Edge Computing

Virtual Center
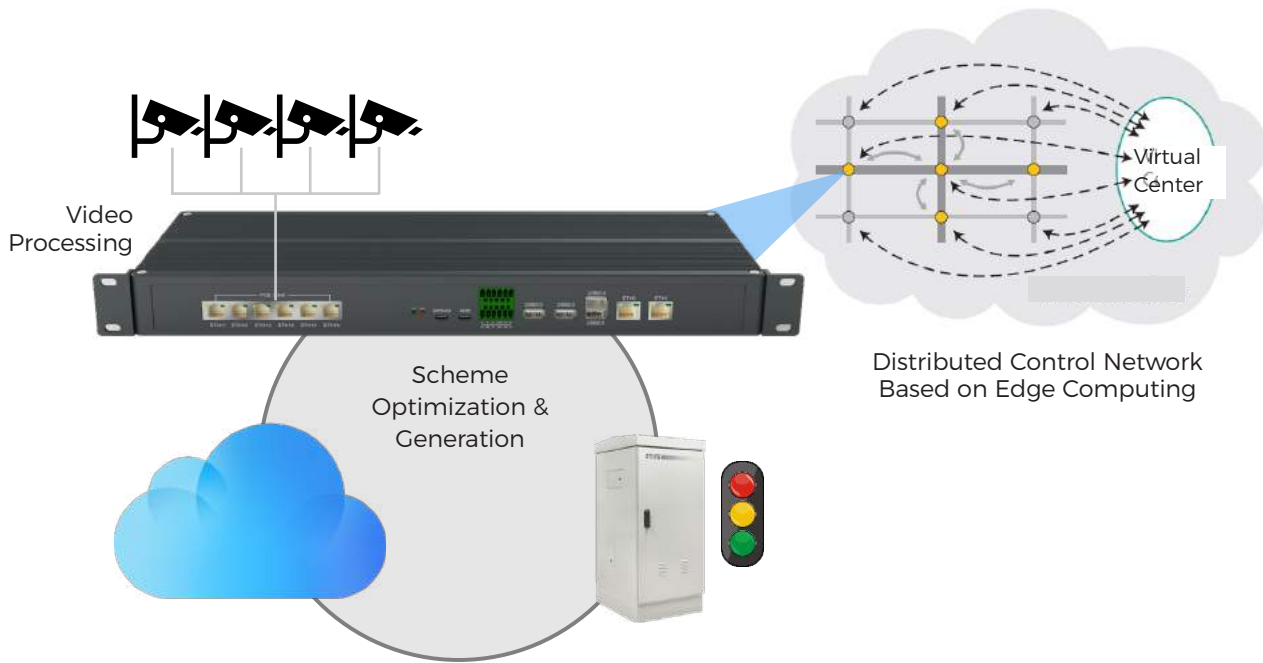
◼ Overview

ClairBox-R AI Box represents the pinnacle of intelligent video recognition devices tailored for traffic applications. Powered by cutting-edge AI technology and boasting formidable video processing capabilities, AI Box excels in real-time capture and analysis of video content. Its core strength lies in its deep learning algorithms, endowing the device with human-like understanding and recognition abilities, accurately identifying shapes of road users and environmental features. With millisecond-level processing speed, it achieves high accuracy vehicle detection, road user classification, and event identification, revolutionizing traffic detection.

Beyond its prowess in video recognition, AI Box serves as a signal algorithm generation hub, streamlining signal optimization processes by providing split, cycle, offset optimization, and scheme generation based on real-time traffic data. Its expanded software functionalities enable green wave generation, special vehicle pre-emption, traffic signal performance evaluation, incident alert, and touchless pedestrian button activation. By fostering distributed computing among AI Boxes across different intersections, it autonomously generates region-based signal optimization solutions, achieving optimal control effects with minimal human intervention.

In essence, ClairBox-R AI Box seamlessly integrates traffic video detection with signal optimization, paving the way for smarter cities and safer travels.

◼ Key Features

- Integrated with Gigabit PoE switch support up to 6 standard or existing PoE cameras.
- AI & neural network video processing for high accuracy vehicle detection, road user classification & event identification.
- Control optimization including split, cycle, offset optimization and scheme generation.
- Group intelligence based on distributed computing.
- Open protocol to any type of legacy controllers.

■ Specification

Hardware Specification	
Processor	NPU processor
Storage	RAM8GB, EMMC32G Extendable: SSD(M.2) hard disk *1 or SATA hard disk *1 Detection data storage: 365 days (without extended storage)
Interface	6*Gigabit Ethernet PoE ports, 802.3af & 802.3at
	USB debug port, USB ADB port for firmware upgrading
	3*USB2.0, 1*USB3.0 ports for expanding all types of devices
	2* Ethernet outputs
Power Supply	90-264 VAC 50/60Hz
Power Consumption	10W (without PoE), PoE 120W max
Dimension	48.26cm * 16cm * 4.45cm
Installation	Rack mounting
IP Class	IP40
Operating Temperature	-40 to 70°C (-40 to 190°F)
Humidity	0-95% non-condensing

Software Specifications		
AI Video Detection	Video Processing	Up to 8 * 1080P video stream @25fps
	Detection Objectives	1. Stop bar vehicle detection 2. Road user identification 3. Traffic event identification 4. Traffic data collection 5. HD video surveillance
	Traffic Data Output	1. Vehicle presence, traffic flow, occupancy, and road user identification 2. Identification targets include truck, car, motorbike, bicycle, pedestrian, light rail 3. Event identification like fog, smoke, illegal reversing on expressway, road congestion, vehicle abnormal driving event and accident detection
AI Signal Optimization	Control Scheme Optimization	Split, cycle, offset optimization.
	Control Scheme Generation	Full scheme generation

Expandable Modules	
Green wave generation	Coordinating the timing of traffic signals to allow a continuous flow of vehicles through a series of intersections.
Special vehicle pre-emption	With the support of V2X module (both on sensor and box), vehicles with V2X OBU could get pre-emption signals.
Traffic signal performance evaluation	Through the flow data collected by the sensors, the AI box can evaluate the efficiency of existing control scheme.
Incident alert	Supported event identification include fog, fire, illegal reversing on expressway, road congestion, vehicle abnormal driving event and accident detection. Other events can be expanded per requirements.
Touchless pedestrian button	Use ClairEye to monitor the pending pedestrians in the certain area and also the speed pedestrians walk cross the street, realize touchless pedestrian cross solutions.

ClairBox-B

Traffic AI Edge Computing Microserver

◼ Overview

The ClairBox microserver series is designed specifically for AI processing applications in traffic video and image analysis. These microservers offer high performance, low power consumption, and excellent adaptability to various environmental conditions. By leveraging a diverse range of deep learning algorithms, they have the capability to handle up to 4/8/16 channels of 1080P video simultaneously. This enables them to provide real-time traffic data collection, including metrics like volume, occupancy, speed, headway, and vehicle attributes, thereby empowering edge AI capabilities.

Ultra-high-performance computing capability

- Support 10.6/17.6/32TOPS INT8 peak computational capability
- Support up to 2.2T FP32 high-accuracy computational capability

Superior encoding and decoding capability

- Support full processing of 4/8/16 channels 1080P high-definition video
- Image decoding capability reaches 240/480/600fps @1080P

Rich interfaces

- Support USB3.0 interface
- Support HDMI high resolution interface
- Support RS485/232 and I/O interface

Flexible deployment

- -20°C to 60/70 °C wide range operating temperature
- Support IP30/40 protection class and fan less heat dissipation
- Optional SATA storage and LTE wireless communication

High reliability

- High-capacity eMMC can be developed to support primary and backup partitions
- Support fault alarm and protection mechanisms for exceptional class failures
- Support programmable encryption chips for privacy information protection

High usability

- BMNNSDK2 all-in-one deep learning development toolkit
- Support mainstream frameworks Caffe/TF/PyTorch/ MXNet/Paddle
- Support mainstream network models and custom operator development
- Supports Docker containerization for rapid algorithm application deployment

Traffic AI algorithm

- Traffic data collection including volume, occupancy, speed, headway, vehicle attributes, etc.

■ Specification

Model		ClairBox-B4/B4A	ClairBox-B8/B8A	ClairBox-B16/B16A
CPU		8 cores ARM A53 @2.3GHz	8 cores ARM A53 @2.3GHz	8 cores ARM A53 @2.3GHz
AI computing power	INT8	10.6 TOPS	17.6 TOPS	32 TOPS
	FP32	1.3 TFLOPS	2.2 TFLOPS	2 TFLOPS
Video/image encoding/ decoding	Video decoding capability	H.264: 1080P @240fps H.265: 1080P @240fps	H.264: 1080P @960fps H.265: 1080P @960fps	H.264&H.265 32*1080P@25fps, 8*4K@ 25fps
	Video decoding resolution	8192 * 8192 / 8K / 4K / 1080P / 720P / D1 / CIF	8192 * 8192 / 8K / 4K / 1080P / 720P / D1 / CIF	8192 * 8192 / 8K / 4K / 1080P / 720P / D 1 / CIF
	Video encoding capability	H.264: 1080P @25fps H.265: 1080P @25fps	H.264: 1080P @50fps H.265: 1080P @50fps	H.264&H.265: 12*1080P@25fps, 3*4K@25fps
	Video encoding resolution	4K / 1080P / 720P / D1 / CIF	4K / 1080P / 720P / D1 / CIF	8K / 4K / 1080P / 720P / D1 / CIF
	Image decoding capability (JPEG)	240fps @1080P	480fps @1080P	600fps @1080P
	Maximum image decoding resolution	32768 * 32768	32768 * 32768	32768 * 32768
Memory	Standard configuration	6GB	12GB	16GB
eMMC	Standard configuration	32GB	32GB	64GB, extendable SSD(M.2 2242 SATA3.0)
Wireless		None	None	WiFi 802.11a/b/g/ n/ac 2.4GHz/5GHz, BT5.0, Optional 4G(mini PCIe interface) , 5G (M.2 interface)
Interface	Network interface	10/100/1000Mbps * 2	10/100/1000Mbps * 2	10/100/1000Mbps * 2
	External interface	USB3.0 *2 / HDMI *1 / TF *1 / RS 485 *2 / IO *1 / Alarm input *2 / Audio *1	USB*2 / HDMI / SATA / RS232 / RS 485 / TF / LTE	USB3.0 *2 / USB2.0 *2 / HDMI *1 / TF *1 / RS 232 *1(DB9) / RS 485 *1(DB9)
Power supply		AC220V	DC12V	DC12V
Operating temperature	Temperature range	-20℃ to 70℃	-20℃ to 60℃	-20℃ to 60℃ (active cooling)
Power consumption	Typical value	18W	20W	20W
IP Class		IP40	IP30	IP40
Dimension	L*W*H	185 * 170 * 43.6 (mm)	188 * 148 * 44.5 (mm)	210 * 130 * 44.5 (mm)

■ Ordering Information

Model	QTY of supported 1080P video channels	With traffic AI algorithm software	Without software, customer may load its own.
ClairBox-B4	4		√
ClairBox-B4A	4	√	
ClairBox-B8	8		√
ClairBox-B8A	8	√	
ClairBox-B16	16		√
ClairBox-B16A	16	√	

ClairEye iSeries

3 Watts AI Traffic Sensor for Premium Video Quality

■ Overview

The ClairEye iSeries is an advanced HD traffic video detector, leveraging cutting-edge neural network processing technology to ensure dependable traffic monitoring even in intricate urban settings. With its sleek and compact design, it allows for effortless installation while maintaining energy efficiency by consuming less than 3 watts. ClairEye offers real-time insights into vehicle presence, traffic flow, occupancy, road user identification, and event detection, empowering cities to optimize traffic control efficiently and effectively.

AI & neural networks processing technology

- The embedded AI algorithm leverages machine learning and deep learning techniques using extensive real traffic data, ensuring accurate detection and automated decision-making.
- Real-time traffic data output includes presence, traffic flow, occupancy (detecting both entering and exiting the detection zone), and road user identification.
- Identification of 80 different targets including truck, car, motorbike, bicycle, pedestrian, and scenarios like fog, fire, accident, traffic jam etc.

Cutting-edge vision with premium video quality

- With a 0.0001Lux starlight CCD, there's no need for Infrared fill light in low-light and challenging weather conditions, while Digital WDR technology further enhances the suppression of intense light.
- Video sensor: 1080P, 1920*1080, 5 megapixel large scene coverage.

3 watts power consumption & compact size

- Ultra-low power consumption less than 3 watts.
- Compact size at 85mm*80mm*218mm (W*D*H) and a weight of 700g, with an IP67 protection rating.
- Easy installation on all kinds of existing mast and

roadside structures.

- Rich communication methods for data collection and device management including Ethernet, IO, and optional Wi-Fi, 4G/5G.

Ready-to-use solution for signal control optimization

- Offer a supplementary edge computing box equipped with algorithm software to enable real-time traffic optimization.
- Supports GB20999, NTCIP and user-defined protocol. It can provide real-time traffic data directly to any kind of traffic controllers or management platform.

■ Specification

Detection objectives	· Stop bar vehicle detection · Road users identification · Traffic event identification · Traffic data collection · HD video surveillance	
Traffic data output	· Vehicle presence, traffic flow, occupancy, and road user identification · Identification of 80 different targets including truck, car, motorbike, bicycle, pedestrian · Event identification like fog, fire, illegal reversing on expressway, road congestion, vehicle abnormal driving event and accident detection	
Video	AI chip	NPU
	Sensor	1/1.8 inch, 5 megapixel large scene coverage
	Resolution	1080P, 1920*1080
	Lens	2.8-12mm
	Frame rate	10-25FPs
	Encoding formats	H.264, H.265
Functional indicators	Detection distance	150m
	Detection zone	Up to 32 detection zones and 32 virtual detectors
	Fill light mode	None
	Installation	Use of the existing pedestrian traffic light poles, vehicle traffic light poles, street light poles and any roadside structures
	Management	Automatic reset, operation status monitoring, embedded logging, remote batch upgrade, etc.
	Communication	RJ45*1, I/O*2 Optional RS485, Wi-Fi, 4G/5G
	Protocols	UDP/TCP
General features	Power supply	POE or DC12-24V
	Power consumption	3W Max
	Operating temperature	-35°C to +70°C
	Operating humidity	0%-95%
	Dimension	85mm*80mm*218mm (W*D*H, including mounting bracket)
	Weight	700g (including mounting bracket)
	IP class	IP67

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■ Applications

Intersection Adaptive Traffic Signal Control
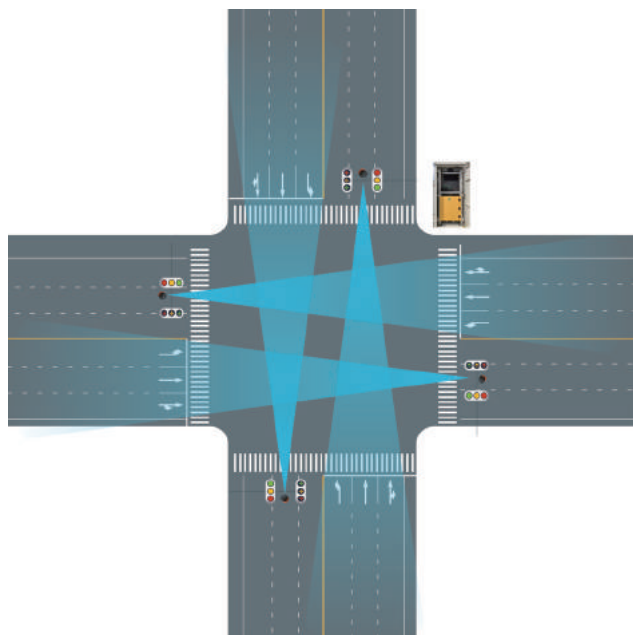
Function Overview

It integrates the information of motor vehicle, special vehicle, non-motorized vehicle and pedestrian traffic demand at intersections. Automatically calculates and generates signal optimization plans in real time according to different traffic demands. Identifies and responds to traffic scenarios and sudden special traffic events. Realizes intersection adaptive traffic control without excessive human intervention, and effectively solves traffic congestion problems.
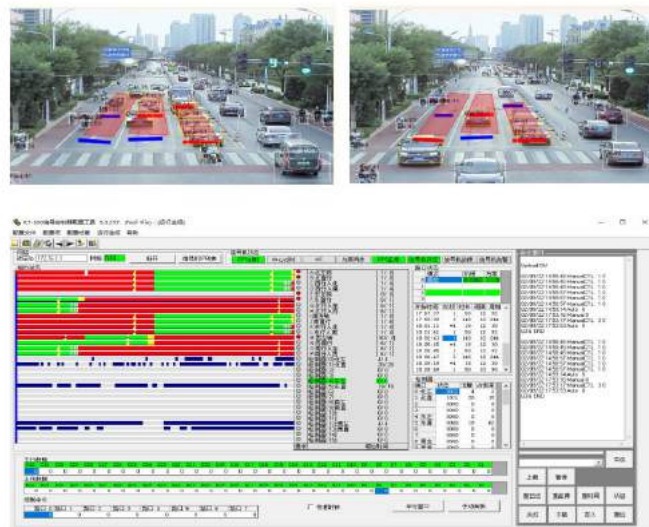
Technical Highlights

- AI video analysis algorithm, accurate identification of people, vehicles, and objects.
- Automatic traffic event analysis and alarm.
- Definable traffic scene recognition logic.
- Traffic signal adaptive control

Adaptive Control of Pedestrian Crossing
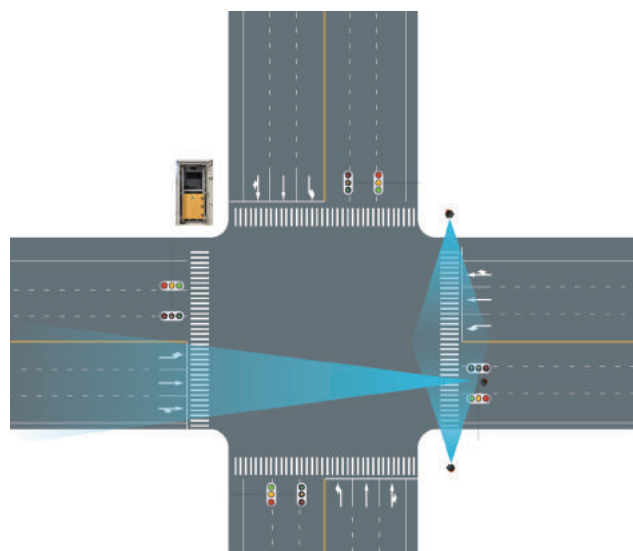
Function Overview

Video recognition technology detects the pedestrian status in the pedestrian waiting area and crosswalk area in real time, including the number of people in the waiting area, the comprehensive waiting time, the pedestrian walking speed in the crosswalk, and the detention situation. Combined with the traffic flow demand of road vehicles and the coordinated control demand of upstream and downstream, it realizes the optimal control of non-contact automatic pedestrian traffic signals.

Technical Highlights

- AI video detection of pedestrian crossing demands.
- Active video detection for a variety of scenarios.
- Automatic cancellation of requests for pedestrian departures.
- Pedestrian crossing adaptive control.

Event Detection

Detection of Pedestrian / non motor vehicle intrusion

Through the pedestrian / non motor vehicle detection model, the objects within the video ROI range are detected. Warn pedestrians or non motor vehicles in time.
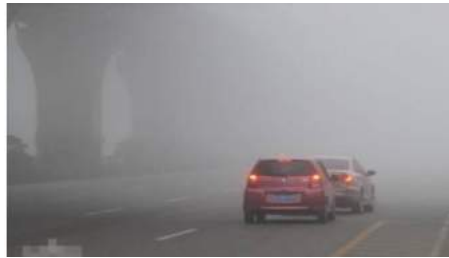
Mass fog

Through the visibility model of expressway, the visibility of Expressway in the video is analyzed (divided into 6 levels), and if it is lower than level 3, it will be warned immediately.

Fire

Through the fireworks detection model, the fireworks in the video are identified and warned.

Detection of illegal reversing on Expressway

Road congestion event detection

Vehicle abnormal driving event detection

■ Ordering Information

ClairEye-iFUN-LENS-COM-PS

i	FUN	LENS	COM	PS
i: iSeries	**PED**: Pedestrian detection **VEH**: Vehicle detection, default **EVE**: Event detection	**2.8**: Lens 2.8mm **4**: Lens 4mm **6**: Lens 6mm **8**: Lens 8mm **12**: Lens 12mm, default	**ETH**: Ethernet, default **EIO**: Ethernet and 2 I/O, for pedestrian crossing button **WIF**: Wi-Fi, conversion accessory is needed **4G**: 4G, conversion accessory is needed **5G**: 5G conversion accessory is needed	**12**: 12VDC power supply **24**: 24VDC power supply **POE**: POE power supply, default

Example:
ClairEye-iVEH-12-ETH-POE: iSeries for vehicle detection with 12mm lens and Ethernet port communication, POE power supply.

LENS Selection

5m	10m	15m	20m	25m	30m	35m	40m
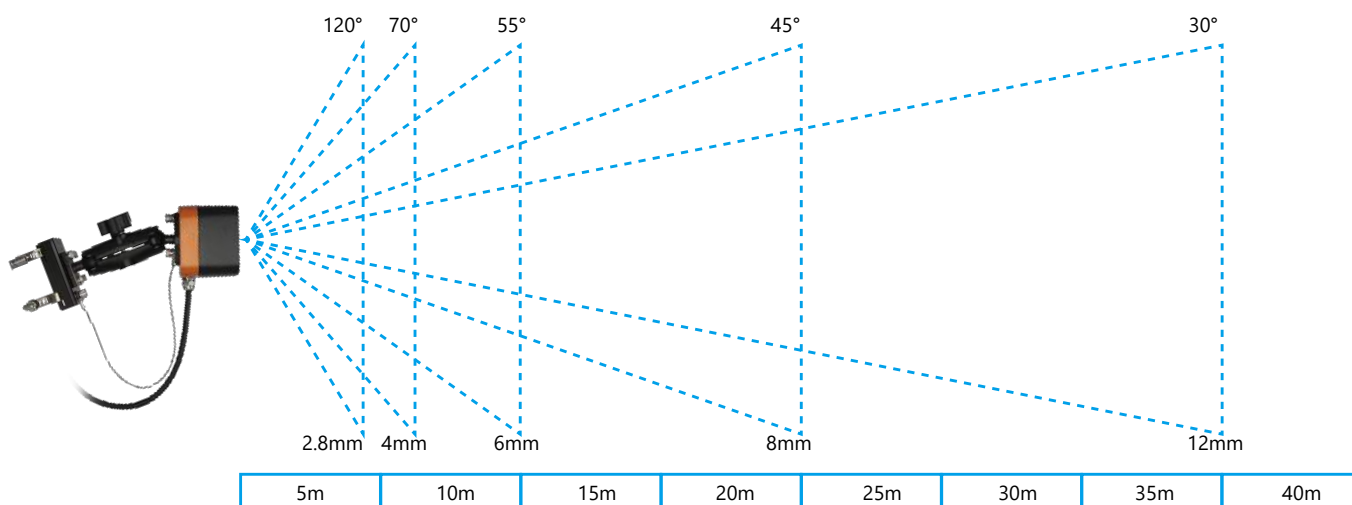
ClairEYE VSeries
Traffic Video Detector

The ClairEye VSeries Video Traffic Flow Detector is the latest generation of video detection products, utilizing the industry's most advanced SOC+GPU hardware architecture and cutting-edge traffic detection algorithms. While maintaining the proven performance and reliability of video detection, it enables easy implementation of future functionality. The ClairEye VSeries supports a wide range of real-time and statistical data, including accurate vehicle speed, facilitating vehicle type detection, as well as travel time analysis. It can also provide precise analysis and alerts for traffic flow status.

This series of products is applied to urban roads to provide real-time traffic data for signal control systems, guidance, and conflict warning systems. Additionally, it offers real-time or historical statistical data through the network for traffic engineers and road planners.

Outstanding Performance

- Real-time Data: Includes traffic flow, real-time speed, vehicle type, queue length, etc.
- Statistical Data: Encompasses traffic flow, average speed, headway time, gap distance, time occupancy rate, space occupancy rate, etc.
- Enhanced Features: Enables vehicle type detection and recognition, achieving accurate travel time analysis between multiple devices.
- Traffic Status: Analyzes traffic conditions such as slow-moving, congestion, and queued traffic.

Easy Installation and Commissioning

- This series of products supports forward, backward, and side detection, allowing for either forward or backward installation on crossbars and support for roadside pole installation.
- Installation can be completed with the included hex wrench; initialization and normal operation can be achieved within five minutes.

Key Features

- Starlight-grade image sensor for excellent nighttime performance.
- Independent GPU chip for running more advanced algorithms.
- Capable of traffic, event, and travel time calculation and analysis.
- Supports hardware and software function expansion based on on-site requirements.
- Compatible with both horizontal and vertical pole installations, expanding application scenarios.
- Product installation and debugging can be completed with a single wrench.
- Patented integrated design ensures high reliability in product operation.

■ Specification

Catagory		Features
Video	Video resolution (main stream)	5M (2560*1920)
	Encoding format	H.264, H.265
	Frame rate	25 frames (adjustable)
	Minimum illumination	Color 0.02Lux@F1.2 Black & White 0.01Lux@F1.2
	Dual stream	Supports main and sub streams
	LENS	3.6-12mm (fixed lens, 12mm as default)
	Video Recording	Support OVNIF protocol for NVR recording
Processor	SOC processor	A7@600MHz
	GPU processor	1T computing power
Detection	Lanes	1-8 lanes
	Flash memory	128M (expandable)
	Real-time data	Speed, traffic flow, vehicle type etc.
	Statistics data	Speed, traffic flow, occupancy rate, headway, queue length
	Traffic status	Slow-moving, congested, queued
	Traffic flow detection accuracy	≥95%
	Vehicle type accuracy	≥95%
	Occupancy detection accuracy	≥95%
	Speed detection accuracy	≥92%
	Queue length accuracy	≥92%
	Non-motorized vehicle filtering rate	≥97%
Communication	Sampling period	30-300s, continuously adjustable
	Communication port	1*LAN
Installation	Dimension	D*W*H: 330*147*229mm (12.99*5.79*9.02inch)
	Weight	2.2KG (4.85 pound)
	Installation height	5m-8m (16.40-26.25 ft)
	Mounting bracket	Universal fixed bracket, adjustable in two axes, supports both horizontal and vertical pole installation
Environment and Reliability	All-weather operation	Unaffected by day and night, weather, and adverse conditions
	Operating temperature	-40 to 75°C (-40 to 167°F)
	Humidity	0-95%RH
	IP class	IP66
	MTBF	>50000 hours
Power	Power supply	AC100-240V, 50-60Hz
	Power consumption	8W

■ Ordering Information

ClairEye-V: VSeries traffic video detector with 12mm focus length as default which fits 20m detection distance.

ClairEye-V-EXT: Convertor terminal from Ethernet to IO output.

ClairWav T24

24GHz Traffic Control Radar Detector

◼ Overview

The ClairWav T24 Series Millimeter-wave Multi-target Traffic Control Radar Detector serves as a non-intrusive road traffic information collection sensor, capable of multi-lane, high-precision detection. It collects real-time, comprehensive, and accurate traffic information, including real-time vehicle position, instant speed, vehicle type classification, lane information, traffic volume, average speed, time occupancy rate, headway distance, queue length, and regional vehicle count, among other fundamental traffic statistics.

The ClairWav T24 Series is suitable for various application scenarios, including traffic information collection on highways, urban expressways, and more, traffic flow detection at urban intersections, roadside perception for V2X applications.

◼ Key Features

- 24GHz operating frequency
- All-in-one solution combining the benefits of radar and camera
- Utilize a 5-megapixel camera for capturing wide scenes
- Coverage of up to 12 lanes
- A range of up to 400m (1312ft)
- Cross-section count reaches up to 64
- 90-degree field of view
- Detection of up to 256 traffic objects simultaneously
- Vehicle flow detection accuracy ≥95%
- Average vehicle speed detection accuracy ≥95%
- Queue Length detection accuracy above ≥95%

▪ Specification

Model	ClairWav-T24L	ClairWav-T24S	ClairWav-T24LC	ClairWav-T24SC
Operating Frequency	24.0-24.25GHz	24.0-24.25GHz	24.0-24.25GHz	24.0-24.25GHz
Maximum Detection Distance	400m (1312ft)	250m (820ft)	400m (1312ft)	250m (820ft)
Non-motorized Vehicle/Pedestrian Detection Distance	180m (590ft)	100m (328ft)	180m (590ft)	100m (328ft)
Video Camera	None	None	5megapixels	5megapixels
Detection Speed Range	±220Km/h	±220Km/h	±220Km/h	±220Km/h
Horizontal Field of View	±45°	±45°	±45°	±45°
Vertical Field of View	±7°	±7°	±7°	±7°
Number of Lanes	12	12	12	12
Maximum Supported Cross-section Count	64	64	64	64
Simultaneously Detected Objects	256	128	256	128
Vehicle Flow Detection Accuracy	≥95%	≥95%	≥95%	≥95%
Average Vehicle Speed Detection Accuracy	≥95%	≥95%	≥95%	≥95%
Queue Length Detection Accuracy	≥95%	≥95%	≥95%	≥95%
Frame Rate	10fps	10fps	10fps	10fps
Dimension	210*154*58 (mm), 8.27*6.06*2.28 (inches).	210*154*58 (mm), 8.27*6.06*2.28 (inches).	210*154*58 (mm), 8.27*6.06*2.28 (inches).	210*154*58 (mm), 8.27*6.06*2.28 (inches).
Weight	2Kg	2Kg	2Kg	2Kg
Communication	100Mbps RJ45 Ethernet port	100Mbps RJ45 Ethernet port	100Mbps RJ45 Ethernet port	100Mbps RJ45 Ethernet port
Power Supply	DC24V (DC21.6V-32V)	DC24V (DC21.6V-32V)	DC24V (DC21.6V-32V)	DC24V (DC21.6V-32V)
Power Consumption	25W	18W	25W	25W
Operating Temperature	-40 to 70℃ (-40 to 158℉)	-40 to 70℃ (-40 to 158℉)	-40 to 70℃ (-40 to 158℉)	-40 to 70℃ (-40 to 158℉)
Storage Temperature	-45 to 85℃ (-49 to 185℉)	-45 to 85℃ (-49 to 185℉)	-45 to 85℃ (-49 to 185℉)	-45 to 85℃ (-49 to 185℉)
Humidity	≤95%	≤95%	≤95%	≤95%
Protection Class	IP67	IP67	IP67	IP67
MTBF	10 Years	10 Years	10 Years	10 Years

▪ Ordering Information

Model	Description
ClairWav-T24L	24GHz, multi-target traffic control radar detector, the detection distance ranges up to 400m
ClairWav-T24S	24GHz, multi-target traffic control radar detector, the detection distance ranges up to 250m
ClairWav-T24LC	24GHz, multi-target traffic control radar detector integrated with video camera, the detection distance ranges up to 400m
ClairWav-T24SC	24GHz, multi-target traffic control radar detector integrated with video camera, the detection distance ranges up to 250m

ClairWav T77

77GHz Traffic Control Radar Detector

■ Overview

The ClairWav T77 Series forward-facing multi-target traffic control radar is a high-performance, long-distance, front-mounted intelligent traffic detection device capable of detecting objects up to a maximum range of 300 meters. Its primary application scenarios include providing vehicle detection for traffic signal control systems, enabling signal sensing and control at large, medium, and small intersections, as well as conducting traffic flow surveys on highways and urban expressways. It can also connect with various intelligent traffic devices, allowing for a wider range of applications, such as smart parking and intelligent streetlight control. This product is characterized by its ability to track multiple targets, high detection accuracy, stable and reliable operation, easy installation and setup, and ease of maintenance.

■ Key Features

■ Provides information about traffic flow, real-time speed/average speed, presence, and queue length for 1-8 lanes within a range of 300 meters.

■ Can simulate the real-time presence of vehicles using either single or double loops, with adjustable loop size and position through software.

■ Easy installation and setup, compatible with existing road infrastructure, featuring a simple structure.

■ Suitable for all weather conditions, including rain, fog, snow, strong winds, ice, and dust.

■ Offers protection against reverse power connection, voltage overload, surge protection, and lightning shielding for the equipment.

■ Provides an option for built-in Power over Ethernet (PoE) version, simplifying installation by combining power supply and data transmission through a single network

cable.

■ Output interfaces support RS485 or 10/100M adaptive network data output, making it compatible with various platforms.

■ 11 watts low power consumption and the option for environmentally friendly solar power supply.

ClairWav-T77 Wave Beam Schematic Diagram
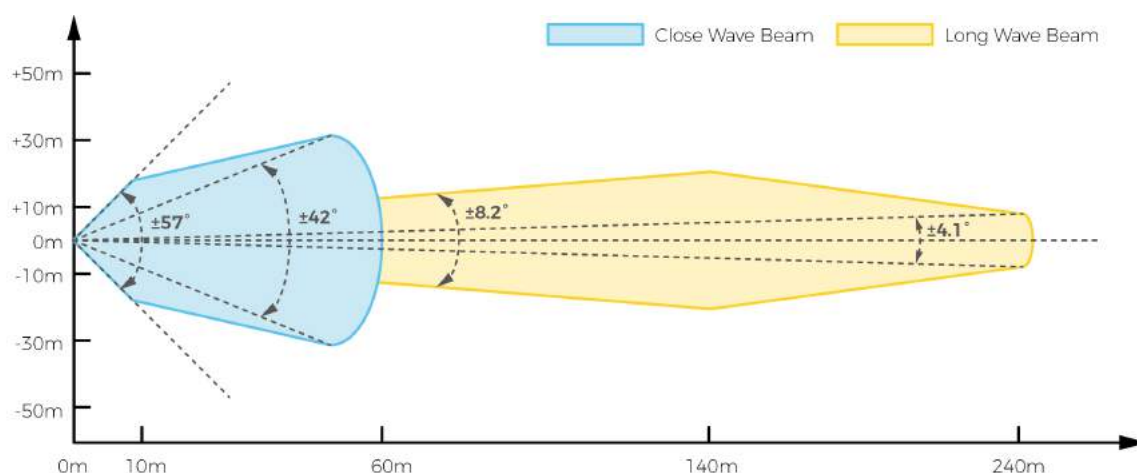
■ Specification

Model	ClairWav-T77
Operating Frequency	77GHz
Modulation Mode	PD Pulse Code Modulation
Operating Mode	Front-mounted
Vehicle Speed Detection Range	0 to 180 km/h
Vehicle Speed Detection Error	≤1%
Flow Detection Accuracy	≥95%
Maximum Detection Range	300m (984ft)
Simultaneously Detected Objects	128
Number of Lanes	8
Data Processing Cycle	Adjustable from 0 to 3600 seconds
Power Supply	DC24V (PoE optional)
Power Consumption	11W
Communication	100Mbps RJ45 Ethernet port (RS485 optional)
Operating Temperature	-40 to 85℃ (-40 to 185℉)
Operating Humidity Range	5% to 95% RH
IP Rating	IP65
Dimension	135*99*42(mm) (excluding the bracket), 5.32*3.90*1.65 (inches)
Electromagnetic Compatibility	Complies with GB/T 17618-1998 "Limits and Measurement Methods for Electromagnetic Compatibility of Information Technology Equipment" requirements
MTBF	10 years
MTTR	≤30 minutes

■ Ordering Information

ClairWav-T77: 77GHz, multi-target traffic control radar detector, the detection distance ranges up to 300m, DC24V power input, communication and configuration through 100M RJ45 Ethernet port. (RS485, or POE power supply can be supported on demand.)

ClairWav P60

60GHz Pedestrian Radar Detector

■ Overview

The ClairWav P60 pedestrian radar is a cost-effective intelligent traffic control device that can detect pedestrian movement within a specific area, including tracking their trajectories and identifying stationary positions. It is suitable for various applications, such as pedestrian crosswalk requests at urban road intersections, monitoring pedestrian movement in specific areas, and indoor pedestrian activity tracking. This product is characterized by its high measurement accuracy, reliable and stable operation, easy installation and setup, and ease of maintenance.

■ Key Features

- It can detect pedestrian movement trajectories and stationary positions.

- Within its beam range, it can be divided into two detection zones as needed.

- The output protocol allows for flexible implementation of pedestrian crosswalk applications, such as crosswalk buttons, pedestrian jaywalking alerts, and designating special non-residential areas.

- The output IO is accurate, efficient, reliable, and easily interfaced with traffic signals.

- It is suitable for industrial environments and is not affected by external factors like lighting, dust, rain, and snow.

- It has modular installation, making it easy to configure and suitable for on-site construction.

- It has max 5 watts low energy consumption, which results in low electricity requirements and costs.

ClairWav-P60
Wave Beam
Schematic
Diagram
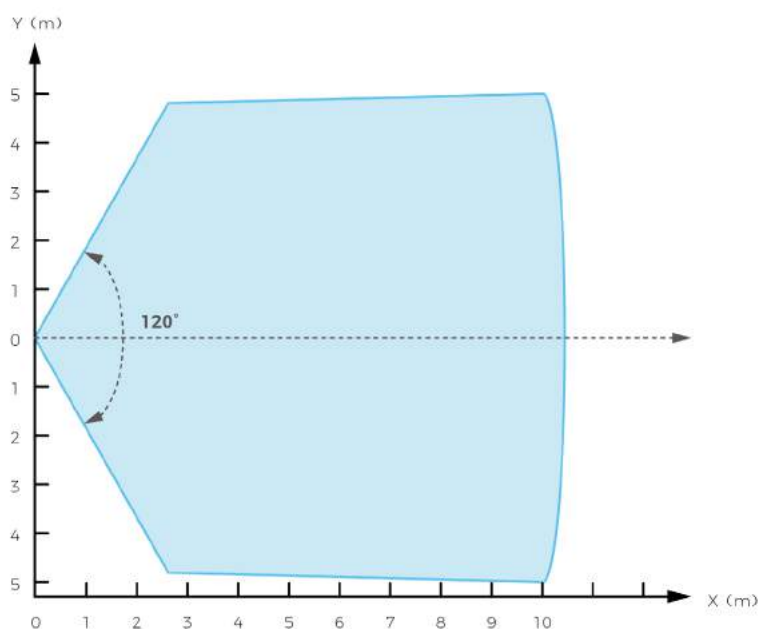
Specification

Model	ClairWav-P60
Operating Frequency	60GHz
Installation Method	Column-side mount
Installation Height	2.0 - 2.5m (6.5 - 8.2ft)
Detection Range	0.5 - 10m (1.6 - 32.8ft)
Target Resolution	1.5m (4.9ft)
Positioning Accuracy	0.5m (1.6ft)
Beam Angle	Horizontal 120°
Installation Downward Angle	10 - 20°
Power Consumption	5W
Power Supply	DC12/24V
Communication	RS485/IO
Operating Temperature	-40 to 65℃ (-40 to 181℉)
Operating Humidity Range	5% to 95% RH
IP Rating	IP65
Dimension	120*113*37.5(mm), (excluding the bracket), 4.72*4.45*1.48 (inches).
Electromagnetic Compatibility	Complies with GB/T 17618-1998 "Limits and Measurement Methods for Electromagnetic Compatibility of Information Technology Equipment" requirements
MTBF	10 years
MTTR	≤30 minutes

Ordering Information

ClairWav-P60: 60GHz, the pedestrian radar detector, the detection distance ranges up to 10m,

ClairWav E24

24GHz Enforcement Radar Detector

◼ Overview

The ClairWav E24 fixed-angle enforcement radar detector is a speed radar product that combines advanced microwave positioning and speed measurement technology with years of experience in traffic radar applications. It innovatively combines precise speed measurement with high-precision positioning to achieve accurate and consistent triggering of vehicle locations at checkpoints. This radar product can accurately and in real-time measure the speed of target vehicles and provide precise triggering signals to capture cameras, allowing vehicles of different speeds and sizes to be captured at the same location.

The fixed-angle radar speed detector also includes practical features such as bi-directional triggering (capturing vehicles traveling in both directions), head-tail triggering, vehicle counting, and vehicle length information. The optimized system design and processing methods ensure that, when integrated with cameras, it can still accurately trigger in low-speed, closely spaced vehicle conditions and adverse weather conditions, thus ensuring a high capture rate.

◼ Key Features

- 4 different operating modes, providing users with flexibility to choose the desired mode.
- It can be used in conjunction with an electronically controlled zoom camera, allowing for pole-free adjustment.
- Accurate and sensitive triggering positions with strong resistance to interference from neighboring lanes.
- Open communication protocols that can be customized according to user needs.
- All-weather speed measurement, unaffected by external factors like lighting, dust, rain, and snow.
- Simple radar operation with easy installation and maintenance.
- Built-in storage to ensure that radar configuration information is not lost even after a power outage.

■ Specification

Model	ClairWav-E24
Antenna Type	Flat-panel microstrip array antenna
Operating Frequency	24GHz
Operating Mode	1. Side-mounted speed beam trigger mode: Activated when a vehicle enters the radar beam angle range, with a beam angle of 6°. 2. Top-mounted speed distance (range) trigger mode: Activated when a vehicle enters the radar beam and reaches the software preset distance with a beam angle of 28°. 3. RAW target mode: Outputs the speed, distance, estimated vehicle length, and target number for each target. 4. RAW point track mode: Outputs the speed, distance, angle, and target number of detected point track targets.
Transmit Bandwidth	750KHz
Transmit Power	20dBm
Speed Measurement Range	5 km/h to 320 km/h
Speed Measurement Accuracy	1 km/h
Measurement Range	0 to 45m (0-148ft)
Range Measurement Accuracy	1m (3.3ft)
Angle Measurement Range	28°
Angle Measurement Accuracy	1°
Capture Rate	99%
Communication	RS485
Power Supply	DC12V (DC10.5-18V)
Power Consumption	4.5W
Response Time	≤25ms
Operating Temperature	-40 to 70℃ (-40 to 158℉)
Operating Humidity Range	5% to 95% RH
IP Rating	IP65
Dimension	234*140*33 (mm), 9.21*5.51*1.30 (inches)

■ Ordering Information

ClairWav-E24: 24GHz, the enforcement radar detector, the detection distance ranges up to 45m, the detection speed ranges from 5 to 320 km/h.

ClairGeo MSeries

Geomagnetic Vehicle Detection System

Onsite Installs
150,000+
Units

Traffic Flow Data Collection Management Platform

- Distance between Repeater and the nearest Detector: <30m
- Distance between Repeater and the nearest Repeater/Receiver: <300m
  (200m in the presence of obstacles such as tree leaves or other obstructions.)
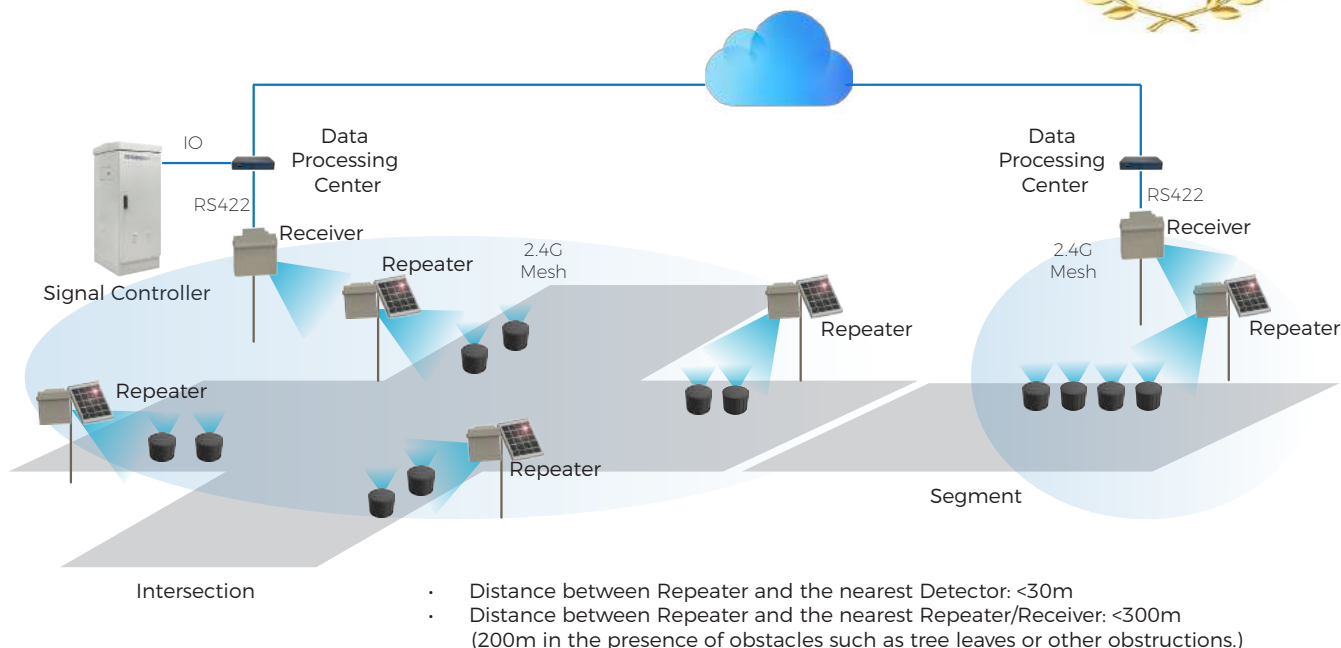
◼ Overview

The Geomagnetic Vehicle Detection System utilizes wireless sensors to detect the presence and movement of vehicles. By capturing data on traffic flow, speed, average speed, occupancy time, vehicle length, queue length, and other parameters, it enables macroscopic monitoring of urban road conditions. This system provides rich and precise real-time detection data for traffic signal control, serves as the foundation for traffic flow data in traffic guidance systems, and offers essential design considerations for urban traffic organization optimization and infrastructure planning. ClairGeo MSeries supports X,Y,Z axis detection and directional wireless communication for higher anti-interference capabilities.

◼ Key Features

X, Y, Z Axis Detection

The M Series employs three-axis (X, Y, Z) detection, collecting driving data at a frequency of 128Hz. It ensures stable detection in the designated area, providing high accuracy in occupancy rates. Additionally, there is no interference from vehicles in adjacent lanes.

Double-layer Ultrasonic Welding Waterproof Design

It adopts double-layer sealing integrated without screw threads, and both inner shell and outer shell are with ultrasonic welding technology for a perfect waterproof performance.

Anti-interference Capability

When the device receives a weak signal with a strength of -78dBm, it can still ensure a frame length of 20 bytes and a frame loss rate of less than 1%, even in the presence of strong interference signals.

Data Accuracy

The system ensures accurate data acquisition through a high-precision magnetic sensor, 12-bit ADC resolution, high sampling rate, and triaxial three-dimensional sampling, complemented by optimized software algorithms.

- Flow accuracy not less than 99%.
- Average occupancy accuracy not less than 95%.
- Average vehicle speed relative error less than 2 km/h, detection speed range 0 to 180 km/h.
- Detection speed relative error less than 2 km/h, detection speed range 0 to 180 km/h.

ClairGeo-MDET

Geomagnetic Vehicle Detector

■ Overview

The detector is designed for data collection, utilizing highly sensitive magneto resistive sensors for precise vehicle information detection. It employs three-axis (X, Y, Z) detection at a frequency of 128Hz, ensuring stability and high accuracy in occupancy rates within the designated area, without interference from adjacent lanes. Featuring a double-layer ultrasonic welding waterproof design, it guarantees optimal waterproof performance. With robust anti-interference capabilities, including DSSS for in-band interference suppression, effective out-of-band interference suppression, dual-channel communication technology, and system networking technology, the detector achieves reliable performance in complex signal environments. The system ensures data accuracy through a combination of high-precision magnetic sensors, 12-bit ADC resolution, high sampling rates, triaxial three-dimensional sampling, and optimized software algorithms.

■ Key Features

Quick & Simple Installation

Each detector is capable of being installed within 5-10 minutes. The process involves drilling a specified location with a diameter of 102mm and a depth of 80-90mm. The detector is then placed into the hole, adjusted to align with the traffic direction, and finally sealed with sealing glue.

Auto-Calibration Function

The geomagnetic detector employs cutting-edge magneto-resistive sensing technology, measuring the Earth's magnetic field composed of the X, Y, and Z axes at a frequency of 128Hz. In the presence of a vehicle, a noticeable change occurs in the magnetic field along the X, Y, or Z axis. In the absence of vehicles, each detector continuously measures the background magnetic field, estimating a reference value. The detectors automatically calibrate based on the magnetic field at their installation location and any long-term changes in the local magnetic field. The reference values may vary over time.

Configurable Detection Area and Sensitivity

Vehicle detection at intersections may have diverse requirements, ranging from cars, trucks, to even light rail trains. The wireless sensor offers configurability with 16 different modes, providing various magnetic field sensitivities and options for setting the vehicle detection area.

Remote Firmware Updates

Through wireless networks, firmware updates for the front-end detectors can be remotely conducted from the management center. This ensures timely updates of the front-end detectors with new firmware versions, maintaining the system's state-of-the-art capabilities.

Long Detector Lifespan

The detector exhibits an extended lifespan through its design features. When there is no vehicle detection data, the communication module enters a sleep mode (i.e., low power mode). To distinguish between the absence of vehicles and a detector malfunction, communication with the upper end is maintained within a specified time frame, with a default value of 30 seconds, even in the absence of vehicle detection data. The detector is designed with power-efficient technology, utilizing long-lasting batteries and flexible settings.

■ Specification

Dimension	Diameter: 94mm (3.70 inches) Height: 64.5mm (2.54 inches)	**Wake-up Time**	3.5µS
Wireless Channel	2.4GHz	**Flow Accuracy**	99%
Channel Bandwidth	2MHz	**Speed Accuracy**	98%
Channels	16	**Occupancy Time Accuracy**	98%
Receive/ Transmit Rate	250kbps	**Headway Time Accuracy**	98%
Antenna Type	Patch antenna	**Detection Speed Range**	0 to 180km/h
Antenna Range	120° (±60°)	**Relative Speed Error**	±2km/h
Receive Sensitivity	-100dBm	**Average Power Consumption**	<10dBm
Detection Mode	Presence/Passing	**Lifespan**	5 years While single lane daily average traffic calculation reaches 20,000 vehicles
Detection Sensitivity	Level 0 to 15	**Power Supply**	Li-SOCl2 3.6V battery, 18Ah
Background Magnetic Field Range	±6Gs	**Protection Rating**	IP68
Detection Method	Earth's magnetic field three-axis detection, adjustable critical values, and automatic calibration of background magnetic field changes.	**Protective Structure Design**	Double-layer shell structure design for dual impact resistance
Detection Range	Adjustable from 0 to 3 meters.	**Protection Sealing Process**	Double-layer ultrasonic welding sealing for dual waterproofing
Types of Detected Vehicles	Common vehicle types include iron tricycles, trucks, trailers, buses, and sedans.	**Operating Temperature**	-45 to 85°C (-49 to 185°F)
Main Frequency	25MHz	**Humidity**	95% non-condensing
Flash Memory	128KB	**Detector Sealing Method**	The detector adopts an integrated, screw-free sealing design to ensure long-term use without water ingress.
RAM	16KB	**Installation Method**	Embedded using geomagnetic adhesive sleeve, with the detector's upper surface flush with the road surface; drilling diameter is 102mm, and depth is 70-80mm.

ClairGeo-MRPT

Geomagnetic Detector Repeater

◼ Overview

The ClairGeo-MRPT repeater is used to extend the transmission distance, facilitating bidirectional data transfer between the detector and the receiver. The repeater is powered by battery and solar panel, eliminating the need for an external power source.

◼ Key Features

Expanded Range and Coverage

A repeater can broaden the signal range and coverage of a receiver. The repeater's installation position must allow the detectors or directly connected repeaters and receivers fall within its line of sight and range. The maximum distance between a repeater and a receiver or another repeater is 300 meters, significantly extending the coverage of a receiver.

Bidirectional Wireless Communication

Enables bidirectional communication between detectors and repeaters, repeaters and receivers, and between repeaters.

Battery-Powered

Operates in a low-power mode for energy efficiency.

Wireless Firmware Upgrades

Supports firmware upgrades through access points and remote firmware upgrades.

Simple Installation

Easy to install at any location that provides good signal coverage to the receiver or connected repeaters.

No Adjustment or Calibration Needed

Requires no tuning or calibration.

◼ Specification

Dimension	Receiver: 109*109*90 (mm), 4.29*4.29*3.54 (inches)
	Solar panel: 135*135 (mm), 5.31*5.31 (inches)
Wireless Channel	2.4GHz
Channel Bandwidth	2MHz
Channels	16
Receive/Transmit Rate	250kbps
Antenna Type	Patch antenna
Antenna Range	120° (±60°)
Receive Sensitivity	-100dBm
Power Supply	Li-SOCI2 3.6V rechargeable battery, equipped with a solar panel
Battery Lifespan	5 years
Protection Class	IP67
Operating Temperature	-45 to 85℃ (-49 to 185°F)
Humidity	95% non-condensing

ClairGeo-MRCV

Geomagnetic Detector Receiver

■ Overview

The ClairGeo-MRCV receiver maintains bidirectional wireless connections with detectors and repeaters, establishing time synchronization, sending configuration commands and acknowledgment messages, and receiving aggregated data from detectors. The data is then transmitted via the 422 bus to the data processor. After processing, it is relayed to nearby traffic signal controllers, remote servers, traffic management systems, or other devices.

■ Key Features

- Interface: 422 bus.
- Data Processing: Capable of processing detection data into different formats to meet the requirements of different devices.
- Synchronization of all lower devices.
- Wireless signal quality detection, able to assess signal strength and connection quality of the link.
- Firmware remote upgrade.
- Easy installation.
- No need for adjustment or calibration.

■ Specification

Dimension	160*160*90 (mm), 6.30*6.30*3.54 (inches)
Wireless Channel	2.4GHz
Channel Bandwidth	2MHz
Channels	16
Receive/Transmit Rate	250kbps
Antenna Type	Patch antenna
Antenna Range	120° (±60°)
Receive Sensitivity	-100dBm
Power Supply	48VDC
Battery Lifespan	5 years
Protection Class	IP67
Operating Temperature	-45 to 85°C (-49 to 185°F)
Humidity	95% non-condensing

ClairGeo-MDPC

Data Processing Center

■ Overview

The ClairGeo-MDPC data processing center is used to receive detection data from the receiver. Through specific algorithms, it processes and generates detection data, capable of transmitting scheduled and real-time data to the central platform server. It can locally store detection data for historical queries and, through network communication, send data to the traffic platform. Additionally, it provides signal switch quantities to the intersection's signal controller for signal induction control, etc.

■ Key Features

- Interface: Ethernet port, supports IP protocol, IO (switching/level), RS232/RS485.

- Data Processing: Connected to the receiver for front-end data collection and storage, and transfers or copies data to the central device.

■ Specification

Dimension	172*126*33 (mm), 6.77*4.96*1.30 (inches)
Storage Type	SD card, default capacity 8GB, expandable to 16GB
Local Data Storage Time	More than 5 years
Local Data	Flow, average speed, occupancy rate, maximum speed, minimum speed, headway time, spacing between vehicles, average vehicle length
Interfaces	RS232, RS485 (with additional conversion interface), Ethernet port, IO (switching/level);
Output Detection Mode	Presence/Pass-through
I/O Output Channels	24 channels, expandable in a cascading manner
Power Supply	48V DC/220V AC
Environmental Temperature	-45 to 85°C (-49 to 185°F)
Power Consumption	5W
Humidity	95% non-condensing
RJ45 Output	Network port outputs parameters such as flow, speed, occupancy rate, and spacing between vehicles

ClairGeo-MMGT

Traffic Flow Data Collection Management Platform
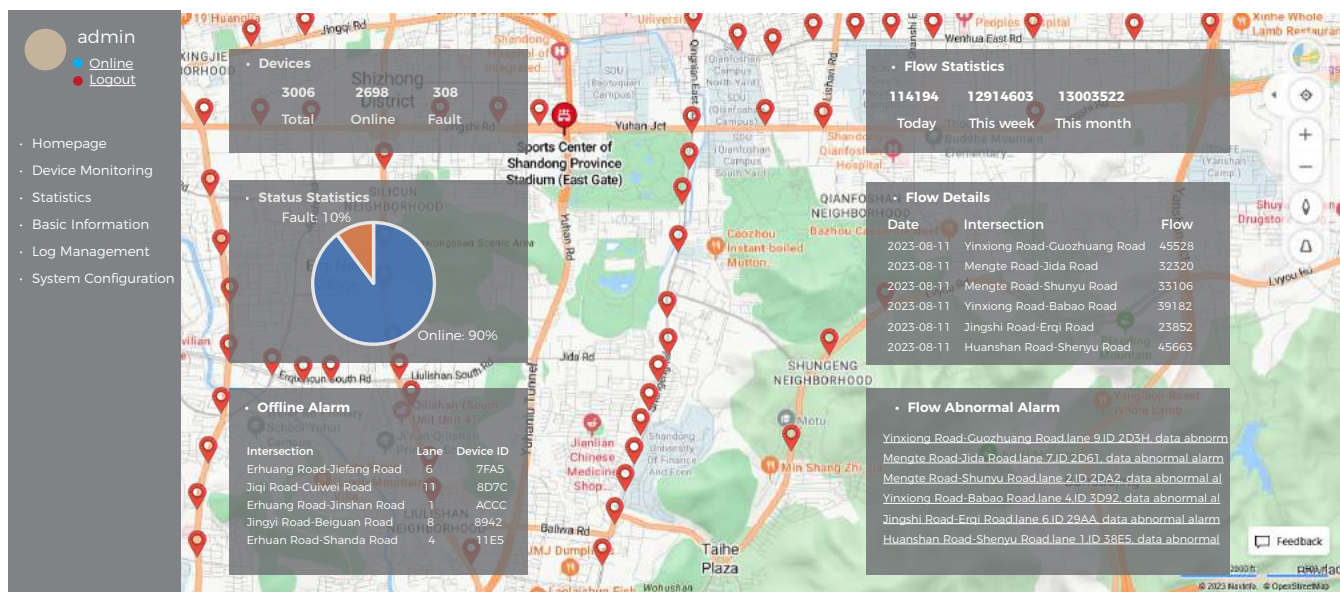
Overview

The ClairGeo-MMGT traffic flow data collection management platform is based on the geomagnetic sensor and data processor. It utilizes the Spring Boot backend service and Vue frontend framework for business separation, combined with GIS visualization, to achieve business functions such as geomagnetic device management, device status monitoring, geomagnetic detection data statistics, and queries.

Function Overview

- Geomagnetic device status monitoring based on GIS and intersection structure, with intuitive display effects.
- Query and export historical data of geomagnetic detection flow, speed, and occupancy rate at different time granularities for lanes, directions, and intersections.
- Data statistics and chart display of geomagnetic detection flow, speed, and occupancy rate at different time granularities.

- Robust user permission management mechanism, supporting multiple types of users.
- Intersection channelization generation and combination of manual base map import to improve device operation and configuration efficiency.
- Integration of third-party platform data interfaces, enabling data integration services.

Key Features

GIS Dashboard & Statistical Analysis

Freedom to choose the statistical time and intersection for analysis, with clear visibility of traffic flow status changes at the intersection. Geomagnetic detection flow data statistics allow separate statistical analysis for each direction. The platform supports data export functionality, enabling diverse secondary data analysis.

Device Management & Status Monitoring

The platform can display and monitor the online/ fault data of devices, such as intersection names, lanes, ID numbers, online status, and faults (battery levels, link quality, signal strength), facilitating the remote maintenance of the geomagnetic system.

◾ Ordering Information

Model	Description
ClairGeo-MDET	MSeries geomagnetic vehicle detector
ClairGeo-MRPT	MSeries geomagnetic detector repeater. (Need one for each direction.)
ClairGeo-MRCV	MSeries geomagnetic detector receiver. (Need one for each intersection.)
ClairGeo-MDPC	MSeries data processing center
ClairGeo-MMGT	MSeries traffic flow data collection management platform (optional)

ClairGeo SSeries

Geomagnetic Vehicle Detection System

Traffic Flow Data Collection Management Platform

Ethernet ☁ Ethernet

Receiver — RS422 — Data Processing Center — RS422 — Receiver

2.4G

Repeater — Repeater is needed while distance is >80m.

2.4G

IO — Signal Controller — IO

2.4G

2.4G

Intersection 1   Intersection N
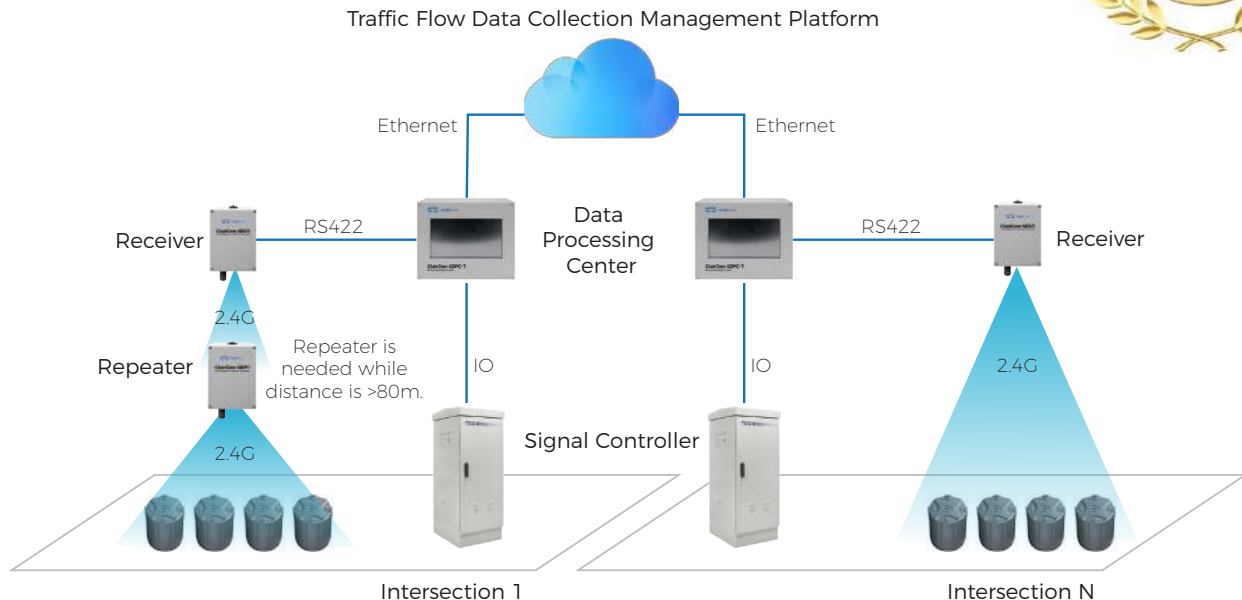
◾ Overview

The Geomagnetic Vehicle Detection System is a widely adopted solution in urban traffic vehicle management due to its ease of installation and exceptional accuracy, even in challenging environmental conditions. Its core principle revolves around a wireless geomagnetic vehicle detector, known for its precision in capturing various traffic parameters with an accuracy rate exceeding 99%. These parameters include vehicle speed, traffic flow, headway time, and occupancy time. The system comprises a geomagnetic detector, a wireless receiver/repeater, and a data processing center.

A perfect substitute for inductive loop detectors

▪ It is fully capable of emulating the output mode of inductive loop detectors, offering a binary "presence" and "no vehicle" output. The occupancy time can be customized to match the length and width of the installed inductive loop and tailored to specific output requirements as needed.

99% traffic data accuracy

▪ It boasts the same high level of accuracy as a loop detector but surpasses it with its remarkably simpler wireless communication and installation process. Flexible deployment

Real-time data collection

▪ It adopts a collision avoidance mechanism for all detectors to report traffic data in real-time. If the channel is occupied, it will resend after a random multiple of 20 milliseconds to ensure that the traffic data is collected in real-time at the center.

360˚ wireless signal angle

▪ The detector generates signals with 360˚ wireless angle. Compared with directional antenna, our solution saves the quantity of needed receivers. As a result, the detector can be freely rotated within the installation hole, making installation and removal straightforward and reducing construction and maintenance costs.

Self-adaptive position learning

▪ After installation, removal should not affect the normal operation of the geomagnetic system, and it can be reused after road maintenance.

Expected 10 years battery life

▪ The battery life can extend to 10 years for regular usage. Considering extreme conditions, with daily single-lane vehicle traffic exceeding 10,000 vehicles in a megacity, the battery life can still last for at least 5 years.

ClairGeo-SDET

Geomagnetic Vehicle Detector

This state-of-the-art device features an ultra-low-power microcontroller as its core, along with a magnetic sensor chip optimized by algorithms for precise road condition insights, including traffic volume, speed, following distance, and occupancy time. Notably, this detector simplifies construction with streamlined factory configuration through geomagnetic identification and blueprint-based planning. Its integrated power control module allows easy management of the device's operational state. With 360° signal coverage, installation and removal are hassle-free, reducing construction and maintenance costs. Moreover, self-adaptive position learning ensures uninterrupted operation, making it a cost-effective solution for road maintenance.

Streamlined Factory Configuration

■ Construction becomes more straightforward by relying on geomagnetic identification and blueprint-based planning, minimizing complexity.

Integrated Power Control Module

■ The device's operational state is easily managed by positioning the label either facing upward to power off or facing downward to enable operation, a simple feature that extends the device's lifespan.

360° Wireless Signal Coverage

■ The geomagnetic device emits signals from the installation hole in all directions, even when rotated freely, ensuring uninterrupted signal transmission. Consequently, there's no need to enclose the geomagnetic device within the installation hole, simplifying both installation and removal processes, which, in turn, reduce construction and maintenance expenses.

Self-Adaptive Position Learning

■ After installation, removal should not affect the normal operation of the geomagnetic system, and it can be reused after road maintenance.

Dimension	Diameter: 87 mm (3.43 inches) Height: 96 mm (3.78 inches)	**Flash Memory**	256KB
Wireless Channel	2.4GHz	**Flow Accuracy**	99%
Channel Bandwidth	2MHz	**Protection Rating**	IP68
Channels	16	**Operating Temperature**	-45 to +85°C (-49 to 185°F)
Receive/ Transmit Rate	250kbps	**Humidity**	93%
Antenna Type	Omni-directional antenna	**Receive Sensitivity**	-110dBm
Antenna Range	360°	**Firmware Upgrade**	Remote firmware upgrade
Detection Mode	Presence/Passing	**Wireless communication distance**	150m
Background Magnetic Field Range	±70Gs	**Detected Vehicle Types**	Common vehicle models including iron tricycles, trucks, trailers, buses, cars, etc.
Detection Method	Earth's magnetic field, adjustable threshold, automatic calibration for background magnetic field changes	**Continuous Working Time**	5 years (under extreme conditions with daily single-lane vehicle traffic exceeding 10,000 vehicles in a megacity)

ClairGeo-SRCV & SRPT

Geomagnetic Detector Receiver & Repeater

The ClairGeo-SRCV detector receiver utilizes 2.4GHz wireless communication technology and adopts existing short-range communication protocols. Its primary role is to act as the central hub where wireless data converges, and it subsequently transmits this data to the data processing center via an RS422 interface. The receiver is powered through the data processing center and serves as the network coordinator, effectively managing communication between all wireless geomagnetic vehicle detectors within the network and the data processing center. It has the capacity to accommodate a maximum of 16 geomagnetic detectors directly within the network, and if more than 16 detectors are required, additional infrastructure must be added.

The ClairGeo-SRPT detector repeater will be needed to ensure reliable communication while the distance between the detector and receiver exceeds 80 meters. It utilizes 2.4GHz wireless communication technology and adopts existing short-range communication protocols. Its primary role is to extend the communication distance between the receiver and the wireless geomagnetic vehicle detectors. Simultaneously, it serves to enhance the capacity of the short-range wireless network terminals. It can be powered through various means, including AC power, solar power, and lithium battery power.

Not subject to installation angle constraints

- Requiring no on-site adjustments, it offers a quick and convenient installation process, ultimately saving on labor costs.

Flexible installation height

- No need for L-rod cross-arm installations, eliminating the requirement for elevated vehicle operations and reducing construction costs.

Versatile power supply options

- It can be powered using solar energy, 220V, or lithium batteries, providing flexibility and adaptability to various power sources.

	ClairGeo-SRCV	ClairGeo-SRPT
Dimension	200mm*150mm*75mm (7.87 inches*5.91 inches*2.95 inches)	
Wireless Channel	2.4GHz	
Channel Bandwidth	2MHz	
Channels	16	
Receive/Transmit Rate	250kbps	
Antenna Type	Omni-directional whip antenna	
Antenna Range	360°	
Receive Sensitivity	-110dBm	
Wireless Communication Distance	700m (between Receiver and Repeater)	
Wired Communication Interface	RS422 (between Receiver and Data Processing Center)	None
Power Supply	DC5V (supplied by the data processing center)	AC220V/Solar Battery/Lithium Battery
Protection Rating	IP68	
Operating Temperature	-45 to +85°C (-49 to 185°F)	
Storage Temperature	-55 to 120°C (-67 to 248°F)	
Humidity	93%	

ClairGeo-SDPC

Data Processing Center

The receiver collects data from the geomagnetic detectors, and send them to data processing center, and then transmits it to the signal control unit or central platform through Ethernet, serial, or I/O interfaces. The data processing center also provides web-based access to communication information, wireless geomagnetic detector data, and status information, allowing for system time and parameter adjustments. Additionally, local data can be stored for over 5 years.

LCD screen displays geomagnetic operational status:

■ Green dots indicate no vehicles, and red dots indicate vehicle presence.

On-site access to parameters

■ Such as battery level and signal strength, reducing maintenance complexity.

Quickly pinpoint maintenance device locations

■ Based on geomagnetic identifiers, minimizing maintenance challenges and saving on maintenance costs.

ClairGeo-SDPC
LED version

ClairGeo-SDPC-T
Touchscreen version

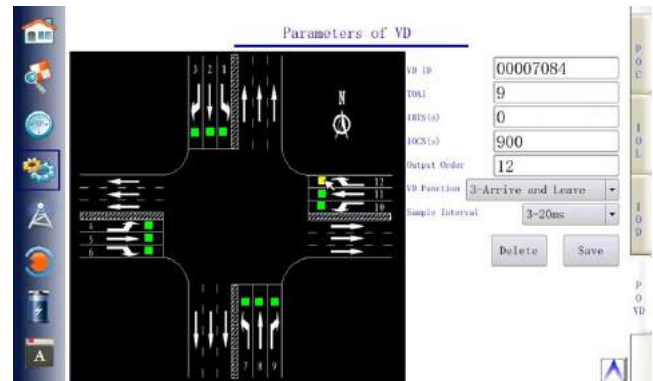|	
Dimension	213mm * 173mm * 86mm (8.39 inches * 6.81 inches * 3.39 inches)
CPU Type	ARM series CPU
System Type	Embedded Linux system
Storage Type	On-board eMMC storage chip
Storage Capacity	8GB (optional 32GB)
Storage Expansion	microSD card/USB drive
Storage Expansion Capacity	32GB
Local Data Storage Time	5 years
Local Data	Flow, average speed, occupancy, maximum speed, minimum speed, headway, spacing, average vehicle length
Interfaces	RS232, RS485, dual Ethernet ports, IO (digital/analog), USB interface
Output Interfaces	I/O, RS232, RS485, Ethernet port
Output Detection Mode	Presence/Passage
I/O Output Channels	32 channels, expandable through cascading
Configuration	Configuration and continuous 24-hour monitoring of device operation status through touch screen, with parameter setting and device monitoring accessible through IE browser via Ethernet port
Firmware Upgrade	Firmware upgrade via USB drive Remote firmware upgrade for detectors via USB drive
Management Platform	1. Includes a management platform for uploading traffic parameters such as vehicle flow, speed, occupancy, and average spacing at detection points 2. The platform allows real-time monitoring of field status and remote modification of field parameters, device reboot, firmware upgrade, and detector firmware upgrade 3. Automatically resumes data transmission after network restoration in the event of network interruption
Power Supply	AC220V
Operating Temperature	-45 to +85°C (-49 to 185°F)
Humidity	93%

ClairGeo-SMGT

Traffic Flow Data Collection Management Platform

Using Socket programming and TCP/IP communication protocol, the system receives business requests from intersections and management clients. Simultaneously, it efficiently stores and organizes the vast amount of collected traffic data using Oracle or SQL Server databases. The management clients have centralized control and oversight of intersection hosts, relays, and detectors via the city center server.

Key functions:

- Subarea Management
- Intersection or Road Segment Management
- Detector Installation Position, Lane Mapping, and Parameter Configuration
- Intersection Host Device Synchronization
- Traffic Statistics Data Retrieval
- Geomagnetic Status Query
- Geomagnetic Packet Loss Rate in the Last 24 Hours
- Geomagnetic Fault Query
- Data synchronization between server database and local database

Bidirectional Synchronization	The system supports bidirectional synchronization between the client's local database and the server database, allowing on-site personnel to conduct equipment installation, debugging, and maintenance even in the absence of a network.
Equipment Management	Configuration of areas, intersections, road segments, lanes, and their corresponding devices. Real-time remote monitoring of device operational parameters and statuses. Remote modification of system parameters and device restarts.
Real-Time Equipment Fault Alert	Instant notification of device faults through email or SMS to relevant personnel.
Real-Time Traffic Data Upload	When vehicles pass through geomagnetic devices, relevant traffic information is uploaded in real-time to the server. It supports automatic data retransmission in case of network recovery. This information accurately reflects real-time or historical traffic parameters.
Traffic Flow Queries	Retrieval of traffic flow on various road segments, intersections, sections, and lanes, with the flexibility to select specific criteria.
Statistical Data	Compilation of traffic parameter statistics for the entire road network's detection points within specified time frames, including traffic flow, speed, occupancy time, and average vehicle spacing.
Traffic Flow Reports	Generation of statistical reports for different time periods (hourly, daily, monthly, and yearly) with the option to choose time slots of 5 minutes, 15 minutes, 30 minutes, or 1 hour.
Report Export	Capability to export reports in TXT or Excel format, with corresponding chart-based statistics.
Integration	Providing interfaces to integrate traffic information with third-party platforms.

■ Ordering Information

Model	Description
ClairGeo-SDET	Geomagnetic vehicle detector
ClairGeo-SRCV	Geomagnetic detector receiver
ClairGeo-SRPT	Geomagnetic detector repeater, needed while distance is >80m
ClairGeo-SDPC	Data processing center, without touchscreen
ClairGeo-SDPC-T	Data processing center, with touchscreen
ClairGeo-SMGT	Traffic flow data collection management platform (optional)

ClairGeo MP2

In-ground Installation Dual-mode Parking Detector

■ Overview

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).

■ Key Features

High Accuracy

The ClairGeo-MP2 is a wireless anti-interference vehicle detection system with strong anti-interference capabilities and self-learning abilities. The detection data accuracy can reach 99%, fully meeting the requirements of parking space detection.

Wide Applicability

With powerful anti-interference capabilities and inherent automatic learning abilities, it is suitable for applications where small cars, trucks, large buses, and public transportation vehicles cause complex and intense disturbances to the Earth's magnetic field. This includes scenarios such as logistics parks, highway service areas, airports, and large bus stations.

Quick and Easy Installation

Each geomagnetic vehicle detector can be installed within 5-10 minutes. During the installation process, only a hole with a diameter of 112mm and a depth of 100mm needs to be drilled at the specified location. The detector is then placed in the hole with the front side facing up. There is no specific orientation requirement for the installation of the geomagnetic vehicle detector, and it is fixed in place by filling the hole with concrete.

Self-Calibration

In the event of a change in the geographical location of the geomagnetic vehicle detector, there is no need for manual intervention for calibration. The detector is equipped with a self-learning and self-calibration feature, reducing the cost of manual maintenance.

Remote Firmware Updates

Through the management center and using wireless networks, firmware updates for the front-end detectors can be performed remotely. This ensures that the front-end detectors are promptly updated with the latest firmware versions, maintaining the system's state-of-the-art functionality.

Long Detector Lifespan

In the absence of vehicle detection data, the communication module enters a sleep mode (i.e., low power mode). To distinguish between the absence of parked vehicles and a potential fault in the geomagnetic vehicle detector itself, the detector reports a health data message to the intelligent parking management cloud platform within a specified time, even if there is no vehicle detection data. This feature contributes to the long lifespan of the detector by ensuring proactive reporting of its operational status.

■ Specification

	ClairGeo-MP2LR	ClairGeo-MP2NB	ClairGeo-MP2CA
Detection Method	Geomagnetic + Microwave Dual Mode Sensor	Geomagnetic + Microwave Dual Mode Sensor	Geomagnetic + Microwave Dual Mode Sensor
Communication Method	LoRa 433MHz (868MHz, 915MHz customizable)	NB-IoT	LTE
Detection Accuracy	≥99%	≥99%	≥99%
Power Supply	38AH Industrial-Grade Lithium Battery (3.6V)	38AH Industrial-Grade Lithium Battery (3.6V)	38AH Industrial-Grade Lithium Battery (3.6V)
Transmit Power	20±3dBm	23±3dBm	23±2.7dBm
Receiver Sensitivity	-119dBm	-125dBm	
Platform Response Time	Not exceeding 1.5 seconds	Not exceeding 4 seconds	Not exceeding 4 seconds
Detect Vehicle Types	All motor vehicles	All motor vehicles	All motor vehicles
Coverage in Water Operations	Normal operation in water with a depth not exceeding 35cm	Normal operation in water with a depth not exceeding 35cm	Normal operation in water with a depth not exceeding 35cm
Communication Protocols		UDP,TCP,CoAP,LwM2M	UDP,TCP,CoAP,LwM2M, MQTT,HTTP,MIPL
Platform Support		Carrier platform, customer's own intelligent parking management cloud platform	Customer's own intelligent parking management cloud platform
Installation	Drill hole in-ground installation	Drill hole in-ground installation	Drill hole in-ground installation
Protection Rate	IP68, double-layer enclosure	IP68, double-layer enclosure	IP68, double-layer enclosure
Operating Temperature	-40 to 85°C, (-49 to 185°F)	-40 to 85°C (-49 to 185°F)	-40 to 85°C (-49 to 185°F)
Dimension	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)
Weight	0.5kg (1.10pounds)	0.5kg (1.10pounds)	0.5kg (1.10pounds)

ClairGeo MP3

In-ground Installation Triple-mode Parking Detector

■ Overview

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.

■ Key Features

High Accuracy

The ClairGeo-MP3 is a wireless anti-interference vehicle detection system with strong anti-interference capabilities and self-learning abilities. The detection data accuracy can reach 99.9%, fully meeting the requirements of parking space detection.

Wide Applicability

With powerful anti-interference capabilities and inherent automatic learning abilities, it is suitable for applications where small cars, trucks, large buses, and public transportation vehicles cause complex and intense disturbances to the Earth's magnetic field. This includes scenarios such as logistics parks, highway service areas, airports, and large bus stations.

Quick and Easy Installation

Each geomagnetic vehicle detector can be installed within 5-10 minutes. During the installation process, only a hole with a diameter of 112mm and a depth of 100mm needs to be drilled at the specified location. The detector is then placed in the hole with the front side facing up. There is no specific orientation requirement for the installation of the geomagnetic vehicle detector, and it is fixed in place by filling the hole with concrete.

Self-Calibration

In the event of a change in the geographical location of the geomagnetic vehicle detector, there is no need for manual intervention for calibration. The detector is equipped with a self-learning and self-calibration feature, reducing the cost of manual maintenance.

Remote Firmware Updates

Through the management center and using wireless networks, firmware updates for the front-end detectors can be performed remotely. This ensures that the front-end detectors are promptly updated with the latest firmware versions, maintaining the system's state-of-the-art functionality.

Long Detector Lifespan

In the absence of vehicle detection data, the communication module enters a sleep mode (i.e., low power mode). To distinguish between the absence of parked vehicles and a potential fault in the geomagnetic vehicle detector itself, the detector reports a health data message to the intelligent parking management cloud platform within a specified time, even if there is no vehicle detection data. This feature contributes to the long lifespan of the detector by ensuring proactive reporting of its operational status.

■ Specification

	ClairGeo-MP3LR	ClairGeo-MP3NB	ClairGeo-MP3CA
Detection Method	Geomagnetic + Microwave + Photosensitive Triple-Mode Detection	Geomagnetic + Microwave + Photosensitive Triple-Mode Detection	Geomagnetic + Microwave + Photosensitive Triple-Mode Detection
Communication Method	LoRa 433MHz (868MHz, 915MHz customizable)	NB-IoT	LTE
Detection Accuracy	≥99.9%	≥99.9%	≥99.9%
Power Supply	38AH Industrial-Grade Lithium Battery (3.6V)	38AH Industrial-Grade Lithium Battery (3.6V)	38AH Industrial-Grade Lithium Battery (3.6V)
Transmit Power	20±3dBm	23±3dBm	23±2.7dBm
Receiver Sensitivity	-119dBm	-127dBm±2dBm	
Platform Response Time	Not exceeding 1.5 seconds	Not exceeding 4 seconds	Not exceeding 4 seconds
Detect Vehicle Types	All motor vehicles	All motor vehicles	All motor vehicles
Coverage in Water Operations	Normal operation in water with a depth not exceeding 35cm	Normal operation in water with a depth not exceeding 35cm	Normal operation in water with a depth not exceeding 35cm
Communication Protocols		UDP,TCP,CoAP,LwM2M	UDP,TCP,CoAP,LwM2M, MQTT,HTTP,MIPL
Platform Support		Carrier platform, customer's own intelligent parking management cloud platform	Customer's own intelligent parking management cloud platform
Installation	Drill hole in-ground installation	Drill hole in-ground installation	Drill hole in-ground installation
Protection Rate	IP68, double-layer enclosure	IP68, double-layer enclosure	IP68, double-layer enclosure
Operating Temperature	-40 to 85°C, (-49 to 185°F)	-40 to 85°C (-49 to 185°F)	-40 to 85°C (-49 to 185°F)
Dimension	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)	Diameter: 110mm (4.33inches) Height: 89mm (3.50inches)
Weight	0.5kg (1.10pounds)	0.5kg (1.10pounds)	0.5kg (1.10pounds)

ClairGeo MPS

Surface-mount Installation Parking Detector

■ Overview

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 millimeter-wave 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 real-time effective data to the intelligent parking management cloud platform.

■ Key Features

High Accuracy

The ClairGeo-MPS is a wireless anti-interference vehicle detection system with powerful anti-interference capability and automatic self-learning ability. The detection data accuracy can reach 99%, fully meeting the needs of parking space detection.

Self-calibration

In the event of a geographical change in the geomagnetic vehicle detector, no manual intervention is required for calibration. It features self-learning and self-calibration functions, reducing manual maintenance costs.

■ Specification

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.

ClairGeo MPLRG

Accessory: LoRa Gateway

■ Overview

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.

■ Key Features

High Stability

Utilizing LoRa anti-interference communication technology ensures communication quality between the detector and the receiver, with a packet loss rate less than 5‰.

Diverse Interfaces

Supporting various connection methods such as RS232, RS485, RJ45, 4G, etc., to meet the needs of different scenarios.

Versatile Power Supply

Supporting multiple power sources, including mains power (AC220V), lamppost (AC220V) power supply, with options for battery charging at night and discharging during the day, as well as solar power.

Remote Firmware Updates

Through the management platform in the central control center, remote firmware updates for the geomagnetic host can be performed, along with real-time monitoring of the geomagnetic host's operational status.

■ Specification

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 (6.61pounds)

■ Ordering Information

	In-ground Installation	Surface-mount Installation	Dual-mode, supporting geomagnetic and radar	Triple-mode, supporting geomagnetic, radar, and photosensitive	LoRa*	NB-IoT	CAT.1
ClairGeo-MP2LR	√		√		√		
ClairGeo-MP2NB	√		√			√	
ClairGeo-MP2CA	√		√				√
ClairGeo-MP3LR	√			√	√		
ClairGeo-MP3NB	√			√		√	
ClairGeo-MP3CA	√			√			√
ClairGeo-MPS		√	√		√		

* Note: Detectors using LoRa need to be paired with a LoRa gateway MPLRG

ClairLup-V1

1-Channel Inductive Loop Detector

Detection Response Time < 10ms

■ Overview

The ClairLup-V1 1-channel inductive loop detector employs a high-performance processor, stable and reliable circuit design, and advanced detection algorithms specially optimized for real-time detection, interference resistance, deadlock prevention, environmental status monitoring, and handling of abnormal conditions. This ensures that the detector operates without the need for maintenance over the long term, significantly reducing user operational costs and enhancing the overall value of user systems.

The ClairLup-V1 detector finds wide applications in traffic enforcement, weighing, toll booth, and other systems for urban roads, highways, bridges, tunnels, and similar road segments.

■ Key Features

■ Supports cascading multiple detectors to effectively eliminate interference between different detector loops.

■ Response time is less than 10 milliseconds, ensuring reliable detection of high-speed passing vehicles on various road types.

■ Features advanced intelligent anti-lock algorithms to ensure long-term, maintenance-free operation.

■ Supports software configuration and querying of functions and parameters for easy network management of the device.

■ Provides real-time vehicle waveform display, allowing for detailed insight into all vehicle passage loop conditions. This greatly facilitates on-site issue analysis and troubleshooting, making problems related to installation or environmental factors easy to identify.

■ Offers real-time loop fault detection and automatically restores normal operation after fault resolution.

■ Supports detection of loop open and short circuits, with the ability to distinguish between loop fault types through fault indicator lights.

■ Provides flexible I/O output capabilities with configurable I/O output modes.

■ Supports RS485 output for vehicle detection data, with customizable data protocols.

■ Specification

Model	ClairLup-V1
Processor	32-bit high-performance ARM
Loop Connection	1-channel loop input
Loop Protection	Supports TVS and transformer isolation
I/O Output	2-channel mechanical relay outputs with configurable output functions (e.g., presence signal, pulse signal)
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling mode, in cascade mode supports parallel detection mode
Device Cascading	Supports multiple devices cascading, supports one master and multiple slave mode
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	10ms
Oscillation Frequency	Supports 4-level frequency adjustment
Baud Rate	57600, 115200 (baud rate programmable via software)
Loop Inductance	10-2000µH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration), supports sensitivity adjustment via serial port
Communication Interface	1 RS485 serial port
Cascade Interface	3-wire cascade interface, supports cascading of no less than 4 detectors
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	1.5W
Operating Temperature	-40 to 85°C (-40 to 185°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	L*W*H: 102 * 72 * 26 (mm), 4.02 * 2.83 * 1.02 (inches)
Weight	140g

■ Ordering Information

ClairLup-V1: 1-channel inductive loop detector.

ClairLup-V2

2-Channel Inductive Loop Detector

Detection Response Time < 10ms

■ Overview

The ClairLup-V2 2-channel inductive loop detector employs a high-performance processor, stable and reliable circuit design, and advanced detection algorithms specially optimized for real-time detection, interference resistance, deadlock prevention, environmental status monitoring, and handling of abnormal conditions. This ensures that the detector operates without the need for maintenance over the long term, significantly reducing user operational costs and enhancing the overall value of user systems.

The ClairLup-V2 detector finds wide applications in traffic enforcement, weighing, toll booth, and other systems for urban roads, highways, bridges, tunnels, and similar road segments.

■ Key Features

- Supports cascading multiple detectors to effectively eliminate interference between different detector loops.
- Response time is less than 10 milliseconds, ensuring reliable detection of high-speed passing vehicles on various road types.
- Features advanced intelligent anti-lock algorithms to ensure long-term, maintenance-free operation.
- Supports software configuration and querying of functions and parameters for easy network management of the device.
- Provides real-time vehicle waveform display, allowing for detailed insight into all vehicle passage loop conditions. This greatly facilitates on-site issue analysis and troubleshooting, making problems related to installation or environmental factors easy to identify.
- Offers real-time loop fault detection and automatically restores normal operation after fault resolution.
- Supports detection of loop open and short circuits, with the ability to distinguish between loop fault types through fault indicator lights.

- Provides flexible I/O output capabilities with configurable I/O output modes.
- Supports RS485 output for vehicle detection data, with customizable data protocols.

■ Specification

Model	ClairLup-V2
Processor	32-bit high-performance ARM
Loop Connection	2-channel loop input
Loop Protection	Supports TVS and transformer isolation
I/O Output	2-channel mechanical relay outputs with configurable output functions (e.g., presence signal, pulse signal)
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling mode, in cascade mode supports parallel detection mode
Device Cascading	Supports multiple devices cascading, supports one master and multiple slave mode
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	10ms
Oscillation Frequency	Supports 4-level frequency adjustment
Baud Rate	57600, 115200 (baud rate programmable via software)
Loop Inductance	10-2000μH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration), supports sensitivity adjustment via serial port
Communication Interface	1 RS485 serial port
Cascade Interface	3-wire cascade interface, supports cascading of no less than 4 detectors
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	1.5W
Operating Temperature	-40 to 85°C (-40 to 185°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	L*W*H: 102 * 72 * 26 (mm), 4.02 * 2.83 * 1.02 (inches)
Weight	140g

■ Ordering Information

ClairLup-V2: 2-channel inductive loop detector.

ClairLup-V4

4-Channel Inductive Loop Detector

Detection Response Time < 8ms

■ Overview

The ClairLup-V4 4-channel inductive loop detector employs a high-performance processor, stable and reliable circuit design, and advanced detection algorithms specially optimized for real-time detection, interference resistance, deadlock prevention, environmental status monitoring, and handling of abnormal conditions. This ensures that the detector operates without the need for maintenance over the long term, significantly reducing user operational costs and enhancing the overall value of user systems.

The ClairLup-V4 detector finds wide applications in traffic enforcement, weighing, toll booth, and other systems for urban roads, highways, bridges, tunnels, and similar road segments.

■ Key Features

- Supports close placement of loops, with a loop-to-loop distance of less than 10cm.
- Supports cascade function; when multiple devices are cascaded, the loops of different devices can effectively avoid interference.
- Supports cascade line self-checking function to ensure a reliable connection of the cascade lines.
- Detection response time is less than 8 milliseconds, meeting the reliable detection needs of various high-speed road vehicles.
- Supports 4-level loop frequency adjustment.
- Supports directional logic detection, enabling the output of corresponding pulse signals based on the direction of vehicle movement.
- Rapidly and intelligently updates the background frequency, continuously tracking changes in environmental parameters.
- Utilizes advanced intelligent anti-lock algorithms to ensure long-term, maintenance-free operation.
- Supports real-time display of passing vehicle

waveforms, allowing for a detailed understanding of all vehicle passage details through the loops. This greatly facilitates on-site issue analysis and troubleshooting, making installation and environmental problems instantly apparent.

- Supports real-time loop fault detection and automatically returns to normal operation after the fault is resolved.
- Supports loop open and short circuit detection, distinguishing between loop fault types through fault indicator lights.
- Offers flexible I/O output capabilities, with configurable I/O output functions.

■ Specification

Model	ClairLup-V4
Processor	32-bit high-performance ARM
Loop Connection	4-channel loop input
Loop Protection	Supports TVS and transformer isolation
I/O Output	5-channel solid-state relay outputs, configurable output modes
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling mode, in cascade mode supports parallel detection mode
Device Cascading	Supports multiple devices cascading, supports one master and multiple slave mode
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	8ms
Oscillation Frequency	Supports 4-level frequency adjustment
Baud Rate	9600 (Baud rate switch set to ON); Configurable baud rates: 4800, 9600, 19200, 38400, 57600, 115200; default is 115200 (Baud rate switch set to OFF).
Loop Inductance	10-2000μH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration), supports sensitivity adjustment via serial port
Communication Interface	1 RS485 serial port
Cascade Interface	Front panel reserved for a multifunctional interface, supports cascading
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	1.5W
Operating Temperature	-40 to 85°C (-40 to 185°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	W*D*H: 118*98*28(mm), 4.65*3.86*1.10(inches)
Weight	370g

■ Ordering Information

ClairLup-V4: 4-channel inductive loop detector.

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ClairLup-V6

6-Channel Inductive Loop Detector

Detection Response Time < 10ms

■ Overview

The ClairLup-V6 6-channel inductive loop detector employs a high-performance processor, stable and reliable circuit design, and advanced detection algorithms specially optimized for real-time detection, interference resistance, deadlock prevention, environmental status monitoring, and handling of abnormal conditions. This ensures that the detector operates without the need for maintenance over the long term, significantly reducing user operational costs and enhancing the overall value of user systems.

The ClairLup-V6 detector finds wide applications in traffic enforcement, weighing, toll booth, and other systems for urban roads, highways, bridges, tunnels, and similar road segments.

■ Key Features

- Supports close placement of loops, with a loop-to-loop distance of less than 10cm.
- Detection response time is less than 10 milliseconds, meeting the reliable detection needs of various high-speed road vehicles.
- Supports 4-level loop frequency adjustment.
- Supports directional logic detection, enabling the output of corresponding pulse signals based on the direction of vehicle movement.
- Rapidly and intelligently updates the background frequency, continuously tracking changes in environmental parameters.
- Utilizes advanced intelligent anti-lock algorithms to ensure long-term, maintenance-free operation.
- Supports real-time display of passing vehicle waveforms, allowing for a detailed understanding of all vehicle passage details through the loops. This greatly facilitates on-site issue analysis and troubleshooting, making installation and environmental problems instantly apparent.

- Supports real-time loop fault detection and automatically returns to normal operation after the fault is resolved.
- Supports loop open and short circuit detection, distinguishing between loop fault types through fault indicator lights.
- Offers flexible I/O output capabilities, with configurable I/O output functions.

■ Specification

Model	ClairLup-V6
Processor	32-bit high-performance ARM
Loop Connection	6-channel loop input
Loop Protection	Supports TVS and transformer isolation
I/O Output	6-channel solid-state relay outputs, configurable output modes
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling mode, in cascade mode supports parallel detection mode
Device Cascading	Supports multiple devices cascading, supports one master and multiple slave mode
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	10ms
Oscillation Frequency	Supports 4-level frequency adjustment
Baud Rate	57600, 115200 (baud rate programmable via software)
Loop Inductance	10-2000μH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration), supports sensitivity adjustment via serial port
Communication Interface	1 RS485 serial port
Cascade Interface	Front panel reserved for a multifunctional interface, supports cascading
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	1.5W
Operating Temperature	-40 to 85°C (-40 to 185°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	W*D*H: 142*98*28(mm), 5.59*3.86*1.10(inches)
Weight	440g

■ Ordering Information

ClairLup-V6: 6-channel inductive loop detector.

ClairLup-V8

8-Channel Inductive Loop Detector

Detection Response Time < 5ms

◼ Overview

The ClairLup-V8 8-channel vehicle detection loop detector utilizes a system architecture combining a 32-bit ARM core processor and an FPGA (Field-Programmable Gate Array). The core detection algorithm is implemented using pure hardware technology. The flexibility of ARM, coupled with the powerful processing capabilities of FPGA, makes the system highly responsive, accurate, resistant to interference, and flexible for expansion. It can be widely applied in various traffic-related systems, such as traffic flow monitoring, traffic enforcement, and security checkpoints, on urban roads, highways, bridges, tunnels, and other road segments.

◼ Key Features

- A single device supports the connection of 8 loop channels and allows for cascading multiple devices, providing flexible business expansion capabilities.

- It features an innovative polling + parallel detection mode that balances efficiency and resistance to interference. When devices are cascaded, the loops of different devices can effectively avoid interference.

- A response time of less than 5ms ensures real-time detection and measurement accuracy, fully supporting the use of traffic flow monitoring, electronic law enforcement, and security checkpoint systems.

- It rapidly and intelligently updates the background frequency, continuously tracking changes in environmental parameters.

- It supports advanced intelligent anti-lock algorithms, ensuring long-term, maintenance-free operation.

- Real-time display of passing vehicle waveforms allows for a detailed understanding of all vehicle passage details through the loops. This greatly facilitates on-site issue analysis and troubleshooting, making

installation and environmental problems instantly apparent.

- It offers real-time loop fault detection and automatically restores normal operation after the fault is resolved.

- Supports loop open and short circuit detection, distinguishing loop fault types through fault indicator lights.

- The core detection unit uses pure hardware detection technology, ensuring stable and reliable operation.

■ Specification

Model	ClairLup-V8
Processor	32-bit high-performance ARM
Coprocessor	Highly powerful computational and processing-capable FPGA
Loop Connection	8-channel loop input
Loop Protection	Supports TVS and transformer isolation
I/O Output	8-channel solid-state relay outputs, configurable output modes
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling & parallel detection mode
Device Cascading	Supports multiple devices cascading, supports one master and multiple slave mode
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	5ms
Oscillation Frequency	Supports 4-level frequency adjustment
Baud Rate	9600, 38400, 57600, 115200
Loop Inductance	10-2000μH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration)
Communication Interface	1 RS485 serial port.
Cascade Interface	Front panel reserved for a multifunctional interface, supports cascading
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	1.5W
Operating Temperature	-40 to 70°C (-40 to 158°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	W*D*H: 192*148*28 (mm), 7.56*5.83*1.10 (inches)
Weight	785g

■ Ordering Information

ClairLup-V8: 8-channel inductive loop detector.

ClairLup-V4F

4-Channel Flow Detection Inductive Loop Detector

Detection Response Time < 3ms

◼ Overview

The ClairLup-V4F 4-channel flow detection loop detector utilizes a system architecture that combines a high-performance processor with an FPGA (Field-Programmable Gate Array). The core detection algorithm is implemented using pure hardware technology. The flexibility of ARM, combined with the powerful processing capabilities of FPGA, results in a system known for its quick response, high accuracy, strong resistance to interference, and flexible scalability.

The ClairLup-V4F supports comprehensive traffic flow data detection, including flow, occupancy, speed, inter-vehicle spacing, headway time, and the percentage of following vehicles. This system is widely applicable in traffic-related systems, such as traffic flow monitoring, traffic enforcement, and security checkpoints, on urban roads, highways, bridges, tunnels, and various other road segments.

◼ Key Features

- Single device supports 4-channel loop inputs.
- Features an innovative polling + parallel detection mode, balancing efficiency and interference resistance.
- A fast response time of less than 3ms ensures real-time detection and measurement accuracy.
- Rapidly and intelligently updates the background frequency, continuously tracking changes in environmental parameters.
- Supports advanced intelligent anti-lock algorithms, ensuring long-term maintenance-free operation.
- Provides real-time display of passing vehicle waveforms, allowing for a detailed understanding of all vehicle passage details through the loops. This greatly facilitates on-site issue analysis and troubleshooting, making installation and environmental problems instantly apparent.
- Offers real-time loop fault detection and automatically

restores normal operation after the fault is resolved.

- Supports loop open and short circuit detection, distinguishing loop fault types through fault indicator lights.
- Flexible I/O output capabilities, with I/O output functions customizable according to user requirements.
- The core detection unit utilizes pure hardware detection technology, ensuring stable and reliable operation.

■ Specification

Model	ClairLup-V4F
Processor	32-bit high-performance ARM
Coprocessor	Highly powerful computational and processing-capable FPGA
Loop Connection	4-channel loop inputs
Loop Protection	Supports TVS and transformer isolation
I/O Output	8-channel solid-state relay outputs, configurable output modes
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling mode, in cascade mode supports parallel detection mode
Device Cascading	Supports multiple devices cascading, supports one master and multiple slave mode
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	3ms
Oscillation Frequency	Supports automatic adjustment
Baud Rate	9600, 38400, 57600, 115200
Loop Inductance	10-2000µH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration)
Real-Time Clock	Onboard high-precision RTC, supports system time synchronization
Communication Interface	1 RS485 serial port
Traffic Flow Data	Vehicles per lane, range: 0 to 65535 Lane occupancy, range: 0% to 100% Average vehicle speed, range: 0 to 255 km/h Average inter-vehicle gap, range: 0 to 65535 meters Average headway time, range: 0 to 65535 seconds Percentage of following vehicles, range: 0% to 100%
Cascade Interface	Front panel reserved for a multifunctional interface, supports cascading.
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	2W
Operating Temperature	-40 to 70°C (-40 to 158°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	W*D*H: 118*148*28(mm), 4.65*5.83*1.10(inches)
Weight	516g

■ Ordering Information

ClairLup-V4F: 4-channel flow detection version inductive loop detector.

ClairLup-V8F

8-Channel Flow Detection Inductive Loop Detector

Detection Response Time < 3ms

◼ Overview

The ClairLup-V8F 8-channel flow detection loop detector utilizes a system architecture that combines a high-performance processor with an FPGA (Field-Programmable Gate Array). The core detection algorithm is implemented using pure hardware technology. The flexibility of ARM, combined with the powerful processing capabilities of FPGA, results in a system known for its quick response, high accuracy, strong resistance to interference, and flexible scalability.

The ClairLup-V8F supports comprehensive traffic flow data detection, including flow, occupancy, speed, inter-vehicle spacing, headway time, and the percentage of following vehicles. This system is widely applicable in traffic-related systems, such as traffic flow monitoring, traffic enforcement, and security checkpoints, on urban roads, highways, bridges, tunnels, and various other road segments.

◼ Key Features

- A single device supports 8-channel loop connection and provides traffic flow statistics for 4 lanes.
- A unique combination of polling and parallel detection modes, balancing efficiency and resistance to interference.
- Response time of less than 3ms ensures real-time detection and measurement accuracy, fully supporting the use of traffic flow, electronic police, security checkpoint systems, and more.
- Quick and intelligent background frequency updates, tracking real-time changes in environmental parameters.
- Supports advanced intelligent anti-lock algorithms to ensure long-term maintenance-free operation.
- Supports real-time display of passing vehicle waveforms, allowing for a detailed understanding of all aspects of vehicles passing over the loops, greatly facilitating on-site issue analysis and identification,

making installation and environmental problems clear at a glance.

- Real-time loop fault detection, automatically restoring normal operation after fault resolution.
- Supports loop open and short circuit detection, enabling the differentiation of loop fault types through fault indicator lights.
- The core detection unit utilizes pure hardware detection technology, ensuring stable and reliable operation.

■ Specification

Model	ClairLup-V8F
Processor	32-bit high-performance ARM
Coprocessor	Highly powerful computational and processing-capable FPGA
Loop Connection	8-channel loop inputs
Loop Protection	Supports TVS and transformer isolation
I/O Output	8-channel solid-state relay outputs, configurable output modes
LED	Bicolor indicator light, indicating loop and vehicle presence status
Detection Mode	Polling & parallel detection mode
Device Cascading	Supports 2 devices cascading
Parameter Configuration	Flexibly configure various operational parameters of the vehicle detector through dip switches
Fundamental Frequency Refresh	Automatically update the reference frequency and track real-time environmental changes
Capture Rate	≥99.9%
Vehicle Separation	Vehicle separation accuracy is ≥99% under normal driving conditions
Fault Recovery	Real-time detection, automatic recovery after fault clearance
Auto-Tuning	Supports automatic tuning function
Response Time	3ms
Oscillation Frequency	Supports automatic adjustment
Baud Rate	9600, 38400, 57600, 115200
Loop Inductance	10-2000μH
Fault Detection	Supports loop open circuit and short circuit detection
Sensitivity Adjustment	8-level adjustable (dip switch configuration)
Real-Time Clock	Onboard high-precision RTC, supports system time synchronization
Communication Interface	1 RS485 serial port, and 1 expandable 10/100M Ethernet port
Traffic Flow Data	Vehicles per lane, range: 0 to 65535 Lane occupancy, range: 0% to 100% Average vehicle speed, range: 0 to 255 km/h Average inter-vehicle gap, range: 0 to 65535 meters Average headway time, range: 0 to 65535 seconds Percentage of following vehicles, range: 0% to 100%
Cascade Interface	Front panel reserved for a multifunctional interface, supports cascading
Power Supply	12/24VDC, supports reverse polarity protection
Power Consumption	4W
Operating Temperature	-40 to 70°C (-40 to 158°F)
Operating Humidity	10-95%, (non-condensing)
Dimension	W*D*H: 192*148*28(mm), 7.56*5.83*1.10(inches)
Weight	795g

■ Ordering Information

ClairLup-V8F: 8-channel flow detection version inductive loop detector.

ClairSaf

## Rural Intersection Conflict Warning System (RICWS)

ClairSaf Rural Intersection Conflict Warning System (RICWS) utilizes a forward multi-object radar detector to real-time monitor the traffic operation status of motor vehicles, agricultural vehicles, etc., on rural roads. It conducts traffic flow data analysis, and the perception processor issues instructions for audio and visual safety warnings, prompting rational control of vehicle speed to reduce the occurrence of accidents at rural level crossings and curved road intersections. This system utilizes solar power and 4G/5G wireless communication technology, effectively addressing the challenges of power supply and network connectivity in rural and mountainous areas.

Rural Road Level-crossing

Rural Road Bend Area
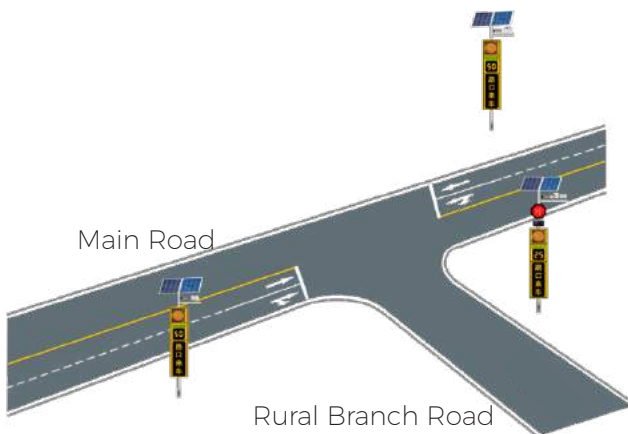
- For vehicles traveling on the main road: When the branch road detects the approach of a motor vehicle, it triggers the main road's "slow" active light signal and activates the yellow flashing warning lights to prompt vehicles on the main road to slow down and proceed with caution.

- For vehicles traveling on rural branch roads: When the main road detects an approaching vehicle at the intersection, it triggers the branch road's "stop" yield active light signal, activates the yellow flashing warning lights, and issues an audible warning (silent during nighttime or under specified conditions). This alerts rural side road motor vehicles, agricultural vehicles, etc., to pay attention to oncoming traffic on the main road and ensure safe passage.
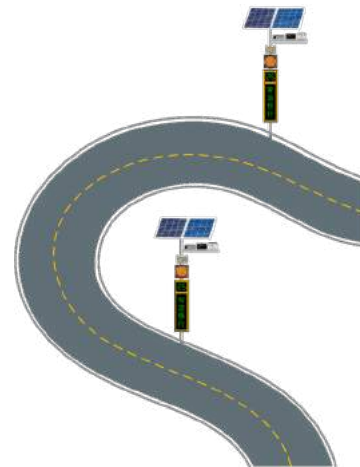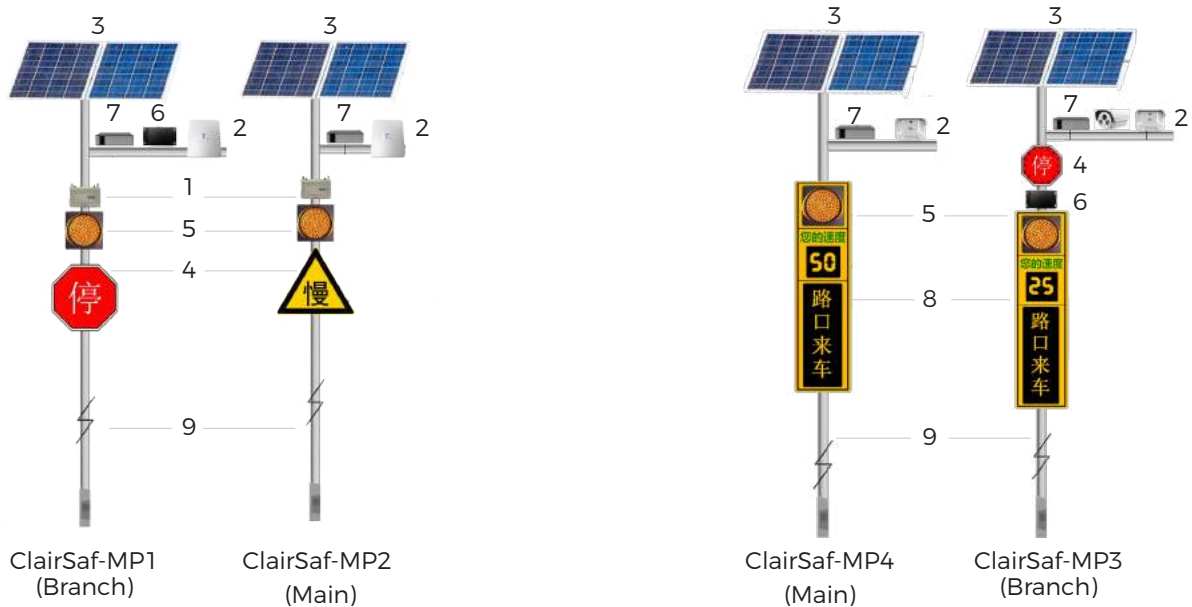
- Detecting no oncoming vehicles in the blind spot of the bend: The yellow flashing light blinks slowly, displaying the speed value of vehicles in this direction (red for overspeed, green for normal speed), illuminating the display with the message 'Curved Section, Slow Down,' indicating that vehicles should proceed with caution for safety.

- When oncoming vehicles are detected in the blind spot of the bend: The yellow flashing warning lights flash rapidly (alerting oncoming traffic to yield), simultaneously displaying the speed value of vehicles in this direction (red for overspeed, green for normal speed). The display illuminates with the message "Curved Section, Slow Down," prompting safe driving. Customizable digital broadcasting announces "Oncoming traffic ahead, slow down for the bend."

■ Key Features

The Rural Intersection Conflict Warning System is characterized by mature technology and system reliability. The cloud control platform employs edge computing, allowing remote monitoring of device operation status. The system can perform statistical analysis on effective warning data and vehicle type flow speed data. It offers advantages such as simple installation and debugging, as well as easy maintenance.

- A safety warning system integrated with detection technology, edge computing, audio-visual displays, and wireless signal transmission operates seamlessly around the clock, effectively preventing the occurrence of traffic accidents.

- The cloud control platform enables real-time monitoring of device operational status, effective warning data, and statistical data on large/small vehicle flow and speed.

- The perception processor, based on control scene requirements, achieves sub-second logical operations, coordinating with devices at both ends of the main road, side roads, and curved sections. It provides real-time warnings to drivers and pedestrians.

- The system adopts an assembly-based approach, making assembly quick and convenient.

- Each terminal can connect to the central platform through 4G/5G, allowing for remote inspection and maintenance.

- Solar power supplies energy, and signals are transmitted wirelessly, eliminating the need for on-site cable laying, saving costs, and enabling rapid deployment. The device can continue to function normally for up to a week in rainy and overcast weather.

■ Hardware Components

ClairSaf-MP1
(Branch)

ClairSaf-MP2
(Main)

ClairSaf-MP4
(Main)

ClairSaf-MP3
(Branch)

1. Process unit. Be in charge of data collection and edge computing.
2. Multiple targe radar. Range 0-150m.
3. Solar panel and battery. 2x150w solar panel and 300Ah battery.
4. Stop/slow down sign. Fully backlit illuminated character. IP67.
5. Yellow flash warning light.

6. Speaker. 25W horn for warning sound broadcasting, can remotely set the voice content and mode.
7. Wireless access unit. Including a 4G/5G router. Share the same power supply with the pole.
8. LED Display. Shows speed and customized characters.
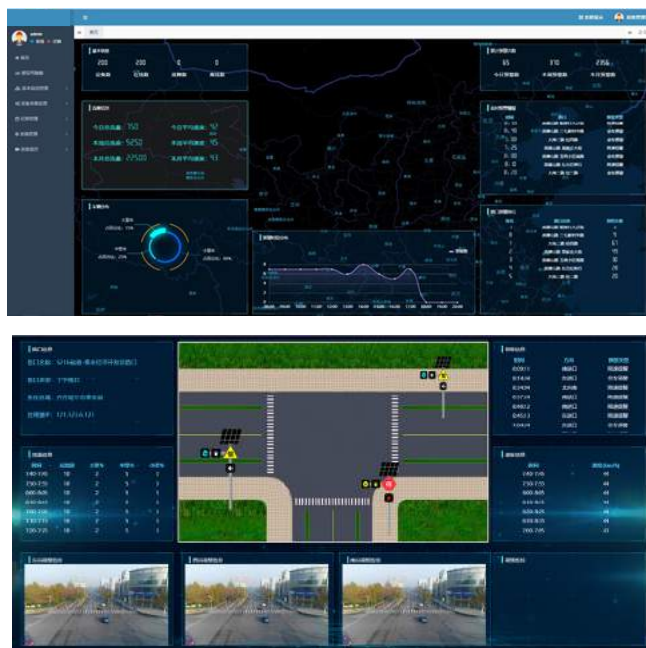9. 4.5/5.2m pole. Surface spraying, ground cage structure

■ Software Platform

ClairSaf-MGT

Rural Intersection Conflict Warning System Cloud Management and Control Platform

Device Management
■ Road network information, intersection device location configuration, etc.

Status Monitoring
■ Monitoring device operational status, including device location, online/faulty status, etc.
■ Single intersection operational status viewing, supporting display of vehicle target trajectories.
■ Traffic operation monitoring video viewing and playback, supporting remote control functionality.

Data Analysis
■ Traffic parameter statistics: Statistical analysis of main/support road motor vehicle flow, speed, and other data.
■ Warning data statistics: Statistical analysis and display of effective warning data, supporting data export.

System Management
■ Area management, user management, department management, role management, etc.

■ Ordering Information

Model	Process Unit	Radar	Solar Panel & Battery	Stop Sign	Slow Sign	Yellow Flash Warning Light	Speaker	Wireless Unit	LED Display	Pole
	1	2	3	4	4	5	6	7	8	9
Hardware										
ClairSaf-MP1	√	√	√	√		√	√	√		4.5m
ClairSaf-MP2	√	√	√		√	√		√		4.5m
ClairSaf-MP3	√	√	√	√		√	√	√	√	5.2m
ClairSaf-MP4	√	√	√			√		√	√	5.2m
Software										
ClairSaf-MGT	Rural Intersection Conflict Warning System Cloud Management and Control Platform									

TraffiClair

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