

Weather Monitoring Solutions for Scenic Areas

Shandong Renke Control Technology

Programme Background



Scenic Ecological Environment

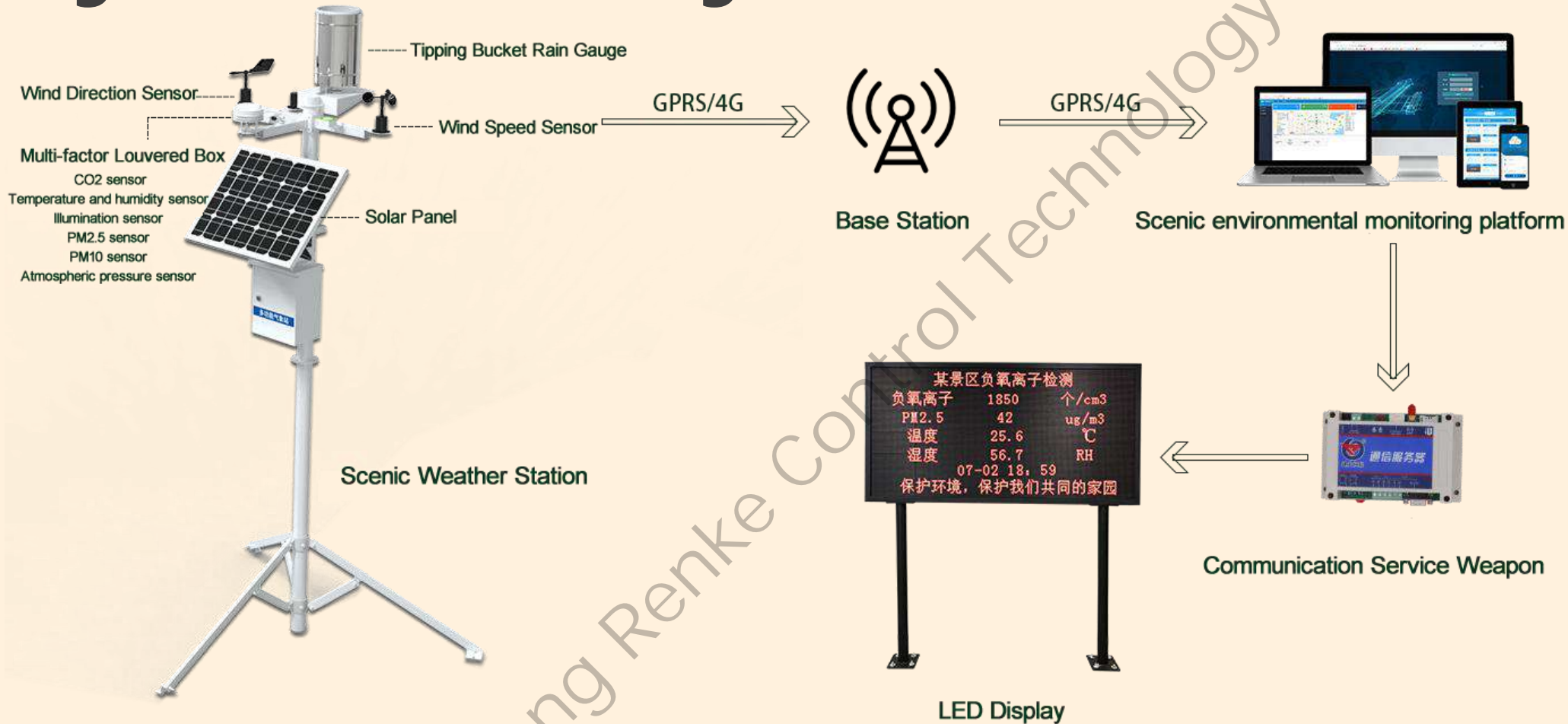
In recent years, with the continuous and rapid development of economy and the adjustment of industrial structure, China's tourism industry has been developing rapidly. However, the rapid development of tourism in China in the 21st century has brought about a prosperous economy and serious ecological problems at the same time. Many tourist sites have experienced serious ecological problems such as reduced atmospheric quality, turbid air with bad odors, changes in the environment for the growth and development of biological populations, reduced biodiversity, reduced quality of ecological landscapes, and so on.

Programme Overview

The scenic weather monitoring solution is specially designed by Jianda Renke for scenic weather data monitoring, which can be used for real-time monitoring of ecological and meteorological environmental factors in scenic areas, providing accurate and systematic information for meteorological data such as real-time weather conditions and ecological comfort indicators in scenic areas.

The scenic weather monitoring solution mainly consists of scenic weather station, data transmission technology, environmental monitoring cloud platform, communication server, and LED display. Weather stations in scenic spots collect air temperature and humidity, wind speed, wind direction, PM2.5, PM10, atmospheric pressure, rainfall, negative oxygen ion concentration and other factors, and then upload the data to the environmental monitoring cloud platform via GPRS/4G signals. It has the functions of automatic weather monitoring, real-time data display, intelligent remote management, and data analysis and storage.

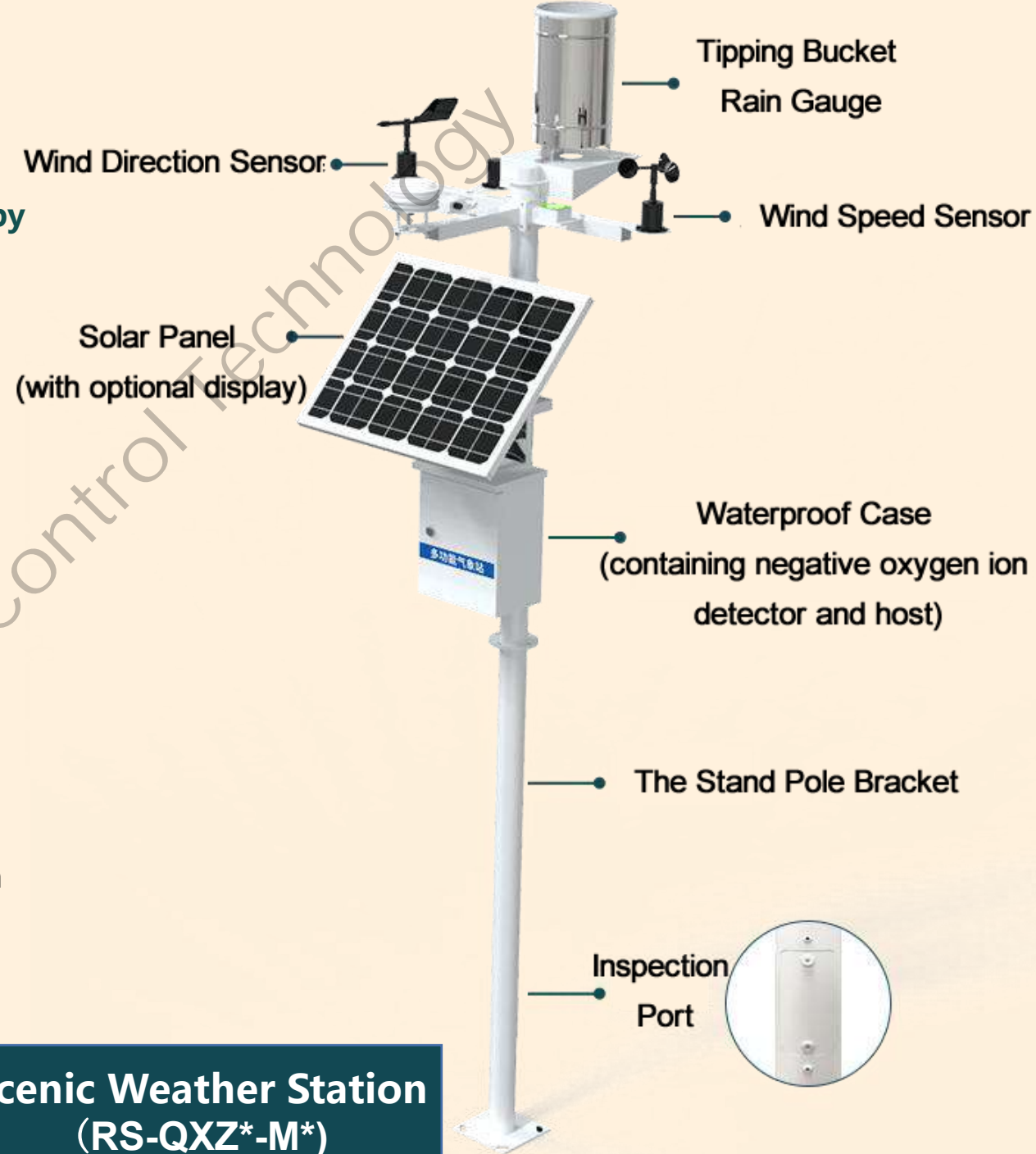
Program Overview Diagram



Note: LED display can be selected according to the user's situation, and timely release tourism weather service information, weather gale and other warning information and other scenic spot notification information through LED display. It not only gives tourists a more intuitive understanding of the scenic environment and enhances the tourism weather information release capability, but also provides scientific basis and basic data for accumulating weather data information and analyzing the climate change of each attraction.

Scenic Weather Station

The scenic weather station is a **monitoring terminal designed by Jianda Renke for the scenic ecological environment monitoring system**, with 1 ModBus-RTU master interface. It can access Renke's **weather multi-element louver box, negative oxygen ion detector, tipping bucket rain gauge, wind speed sensor, wind direction sensor and other 485 sensors**, and monitor **air temperature and humidity, wind speed, wind direction, PM2.5, PM10, atmospheric pressure, rainfall, negative oxygen ion concentration and many other factors**. Monitoring elements can be freely matched. Equipped with solar power supply system and high-strength vertical pole, it can resist wind, rain and snow, and automatically monitor the changes of various meteorological elements of the scenic area environment 24 hours a day.



**Scenic Weather Station
(RS-QXZ*-M*)**

Scenic weather station features

Free Cloud Platform

Routing Design

It can be wired according to 485 rules, and the routing is simple. Considering the later maintenance and fault judgment, our company provides one-to-one equipment connection. If there is a problem with any device, unplug the cable to isolate the fault.

Standalone Sensors

Micro-connector Routing Method

RS485, Ethernet, GPRS/4G three data upload methods (Optional)

Pole Flange Installation

External LED Screen Available

Electric Control Box Design

Adopt high-strength sheet metal box and white spraying anti-rust program, beautiful appearance, resistance to long-term rain and snow, solar radiation, adapting to a wide range of temperature. The use of well-designed heat dissipation grille, airflow channels to ensure that the internal temperature of the box under direct sunlight is constant. According to user needs, it can also choose the electric control box with Windows, through which you can intuitively see the weather station data and the working state of the internal structure. After adding Windows, it can still reach IP65 protection level.

**220V mains supply
Solar panel + battery supply
Solar panel + 220V mains supply (Optional)**

National Standard Tipping Bucket Rain Gauge

Pole type Tripod type Two types of installation (Optional)

Meteorological multi-element louver box

The meteorological multi-element louvered box combines **noise, PM2.5 and PM10, temperature humidity, atmospheric pressure, and light** in a single box. Small size, light weight, high quality anti-UV material, long service life, high sensitivity probe, stable signal and high precision. The key components are imported devices, stable and reliable, with wide measuring range, good linearity, high waterproof performance, easy to use and install, long transmission distance, etc.



Multi-element louver box (RS-BYH-M)

- ▲ Noise acquisition with accurate measurements and ranges up to 30dB~120dB.
- ▲ PM2.5 and PM10 simultaneous collection, range: 0-1000ug/m³, resolution 1ug/m³, unique dual-frequency data collection and automatic calibration technology, consistency up to ±10%.
- ▲ Measuring environment temperature and humidity, the measuring unit is imported from Switzerland, range -40~120°C.
- ▲ Wide range 0-120 Kpa barometric pressure range for applications at all altitudes. Light acquisition module with high-sensitivity light-sensing probe, light intensity range 0~200,000 Lux.
- ▲ Adopt special 485 circuit, communication is stable, 10~30V wide voltage range power supply.

Negative Oxygen Ion Detector

Full-color screen negative oxygen ion detector with LCD display, real-time display of the negative oxygen ions concentration of negative oxygen ions in the air, adopts standard MODBUS-RTU communication protocol with RS485 signal output. The detector not only collects the concentration of negative oxygen ions with high precision, but also supports optional temperature and humidity, formaldehyde, PM (PM2.5 and PM10), TVOC and other sensors for multi-factor monitoring.

- ▲ Large LCD display with beautiful appearance;
- ▲ Adopt high precision negative oxygen ion measurement unit with good long-term stability and small drift;
- ▲ Adopt special 485 circuit, standard ModBus-RTU communication protocol, communication address and baud rate can be set;
- ▲ Wide voltage range of 10~30V DC power supply;
- ▲ Easy to set parameters by pushing a button;
- ▲ Optional storage function with USB flash drive for export;
- ▲ 65535 data can be stored.



**Negative Oxygen Ion Detector
(RS-NEGO-N01)**

Tipping Bucket Rain Gauge

The tipping bucket rain gauge is a primary instrument for precipitation measurement, and its performance meets the requirements of the national standard **GB/T 21978.2-2014**

"Precipitation Observation Requirements".The core component of this instrument, the tipping bucket, adopts a three-dimensional streamlined design,which makes the bucket turn water more smoothly, and has the function of self-washing dust and easy cleaning. Pulse to 485 signal output,it can directly read the rainfall, no secondary calculation, simple and convenient.

- ▲ Rain bearing diameter: $\varnothing 200\text{mm}$; Sharp edge angle: $40^\circ \sim 45^\circ$;
- ▲ Resolution: 0.2mm;
- ▲ Measurement accuracy: $\leq \pm 2\%$ (indoor artificial precipitation, based on the instrument's own displacement);
- ▲ Rain intensity range: 0mm \sim 4mm / min (allowed to pass the maximum rain intensity 8mm / min);
- ▲ Communication: 485 communication (standard MODBUS-RTU protocol);
- ▲ Max power consumption: 0.24W;
- ▲ Working environment: environment temperature: 0 \sim 50°C ;Relative humidity: <95%(40°C);
- ▲ Power supply range: 4.5~30V.



**Tipping Bucket Rain gauge
(RS-YL-N01-4-*)**

Wind Speed Sensor

The wind speed sensor is compact and lightweight, easy to carry and assemble, the **three cups design concept** can effectively obtain wind speed information, the shell is made of **polycarbonate composite material**, with good anti-corrosion, anti-erosion and other characteristics, ensuring the long-term use of the sensor without rusting phenomenon, while with the internal smooth bearing system, to ensure the accuracy of information collection.

- ▲ Range: 0-70m/s;Resolution 0.1m/s;
- ▲ Anti-electromagnetic interference;
- ▲ The use of the bottom of the wire, completely eliminate the aging of the aviation plug rubber pad problem, long-term use is still waterproof
- ▲ Adopting high performance imported bearings, low rotation resistance and accurate measurement.
- ▲ Polycarbonate shell, high mechanical strength and hardness, anti-corrosion, no rust can be used in outdoor for a long time.
- ▲ The structure and weight of the equipment are carefully designed and distributed, with low rotational inertia and sensitive response.
- ▲ Standard ModBus-RTU communication protocol, easy access.



Wind Speed Sensor (RS-FSJT-N01)

Wind Direction Sensor

The wind direction sensor is compact and lightweight, easy to carry and assemble, the new design concept can effectively obtain wind direction information, there are **8 directions, 360 °** two types of measurement range available. The housing is made of **polycarbonate composite material**, which has good anti-corrosion and anti-erosion characteristics and can ensure that the sensor will not be deformed in long-term use, while with the internal smooth bearing system to ensure the accuracy of information collection.

- ▲ Anti-electromagnetic interference;
- ▲ Adopt high performance imported bearings, low rotation resistance and accurate measurement;
- ▲ Polycarbonate shell, high mechanical strength and hardness, anti-corrosion, no rust can be used in outdoor for a long time;
- ▲ The structure and weight of the equipment are carefully designed and distributed, with low rotational inertia and sensitive response;
- ▲ Standard ModBus-RTU communication protocol, easy access.



**Wind Direction Sensor
(RS-FXJT-N01)**

Data Transmission Technology

Based on GPRS communication technology, the solution can actively send real-time data to the cloud platform of remote monitoring center of scenic spot through GPRS signal at regular time.



Environmental Monitoring Cloud Platform

Scenic environmental monitoring cloud platform is a remote monitoring center cloud platform equipped by Jianda Renke for environmental monitoring in scenic areas. It can receive **real-time data from outdoor weather stations**, support **analysis, view and export historical data**, **set weather station data parameters remotely**, etc. It supports **multiple login methods** for **computer web terminal**, **mobile APP** and **WeChat public number**.

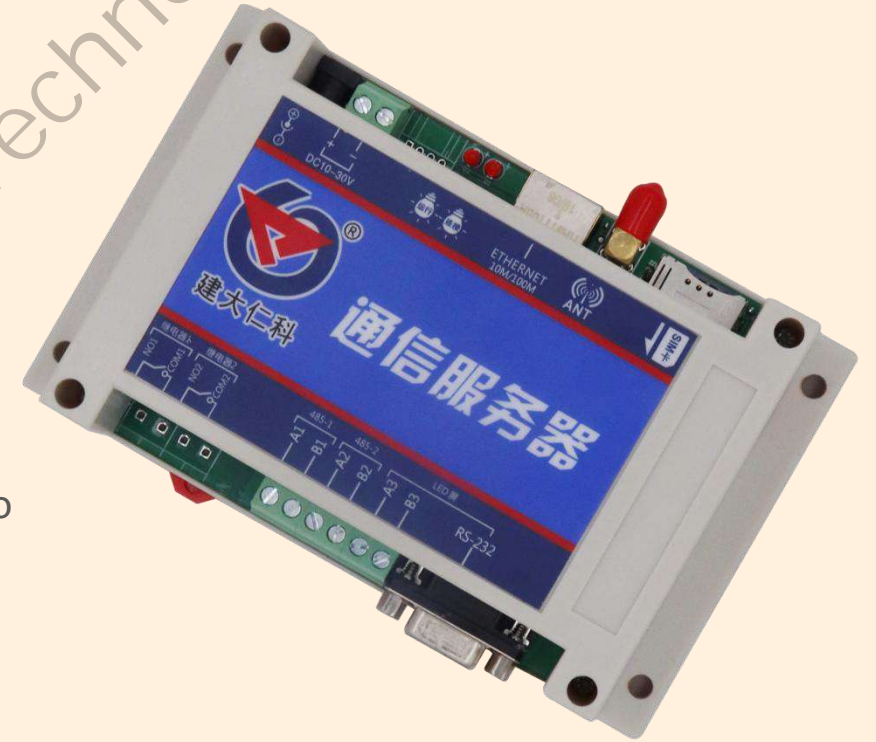


Communication Server

In order to enable tourists to more intuitively understand the real-time meteorological data in the scenic spot, equipped with a communication server, it is able to transfer the environmental data captured from the cloud platform to the decentralized **8 LED**

displays in real time, which can support a maximum of **512*1024** **pixel LED screens**.

- ▲ RS232, RS485 two-channel communication protocol with optional connection to the LED screen;
- ▲ Network port and GPRS to obtain real-time data;
- ▲ Automatic data refresh after power failure and renewal;
- ▲ Receive real-time data up to 32 nodes (devices);
- ▲ Support for text, clock and table displays;
- ▲ DC10~30V wide DC supply voltage.



**Communication Server
(RS-DCEN-M)**

LED Display

The LED display screen with communication gets data from the cloud platform and displays the real-time data on the LED screen.

The LED display screen can be installed in the scenic area, the vertical pole is 1.5m high, the screen is 2m wide and 1.4m high (default), **which is capable of broadcasting real-time data from 32 nodes in 4 screens in rotation.** If we want to see the real-time data directly from a distance, we can adjust the font size of the display part to be larger.



LED Display (RS-DCEN-LED-19296-*)

Programme Function

01

Real-time Monitoring

It collects real-time data from each site and presents the site conditions to users in a quick, effective, clean and intuitive way through real-time monitoring and on-site monitoring functions.

02

Historical Data

It can query the historical data of one or more monitoring stations in the jurisdiction. According to the need to select the corresponding station, time range and data type (hourly data, daily data, monthly data, quarterly data) for query. Line graphs and pie charts visually compare the fluctuations of the same parameter at different stations within the time period, making it easy to compare and distinguish; list display of specific data, support for export and comparative analysis.

03

Over-limit Alarm

When monitoring any value exceeds the limit, the system will add the administrator's mobile phone number on the cloud platform to send alarm information by phone, SMS in the first time. At the same time cloud platform will platform information alerts, font color from green to red or email alerts to notify the value exceeds the limit.

04

Mobile Supervision

It supports real-time data viewing on mobile clients, realizing remote supervision and data viewing by supervisors anytime and anywhere.

05

Electronic Map

It can visually display all the dust monitoring sites in the area, and the list on the right side can quickly query the desired site. Move the mouse over a site to view the name of the site, click on a site to view real-time dust monitoring data, basic site information, parameter change trends, etc.