



TRANSPORTATION
INTELLIGENCE

HiaRailAI

Large Model

Your Partner on the Journey to
Smarter Rail Transit



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HiaRailAI Large Model 01/06

Your Partner on the Journey to Smarter Rail Transit

HollyInsight

Empower Smarter Operations for Better Decisions

- › Onboard Train Control Large Model
- › Ground Train Control Large Model
- › Basic Signalling Large Model

HollyVision

AI-Powered Vision — Sharper, Broader and Easier

HollyChat

Your Smarter Assistant for Evolving Operations & Maintenance

Application Scenarios 07/09

Redefine Industries Through Real-World Solutions

- › Intelligent Railway Operations & Maintenance
- › Unmanned Railway Inspection
- › Railway Transport Organization

HiaRailAI Large Model

The HiaRailAI Large Model is built upon a mature, open-source general-purpose large model and is enhanced by a multi-agent architecture and industry-specific data. It undergoes continuous pre-training, supervised fine-tuning, prompt engineering, and reinforcement learning for iterative optimization. Additionally, it integrates with a dedicated rail transit knowledge base for customized development, delivering intelligent, efficient, and precise solutions for transport decision support, operation and maintenance fault diagnosis, and proactive safety protection—offering a new level of interactive experience and service support.

Product Features

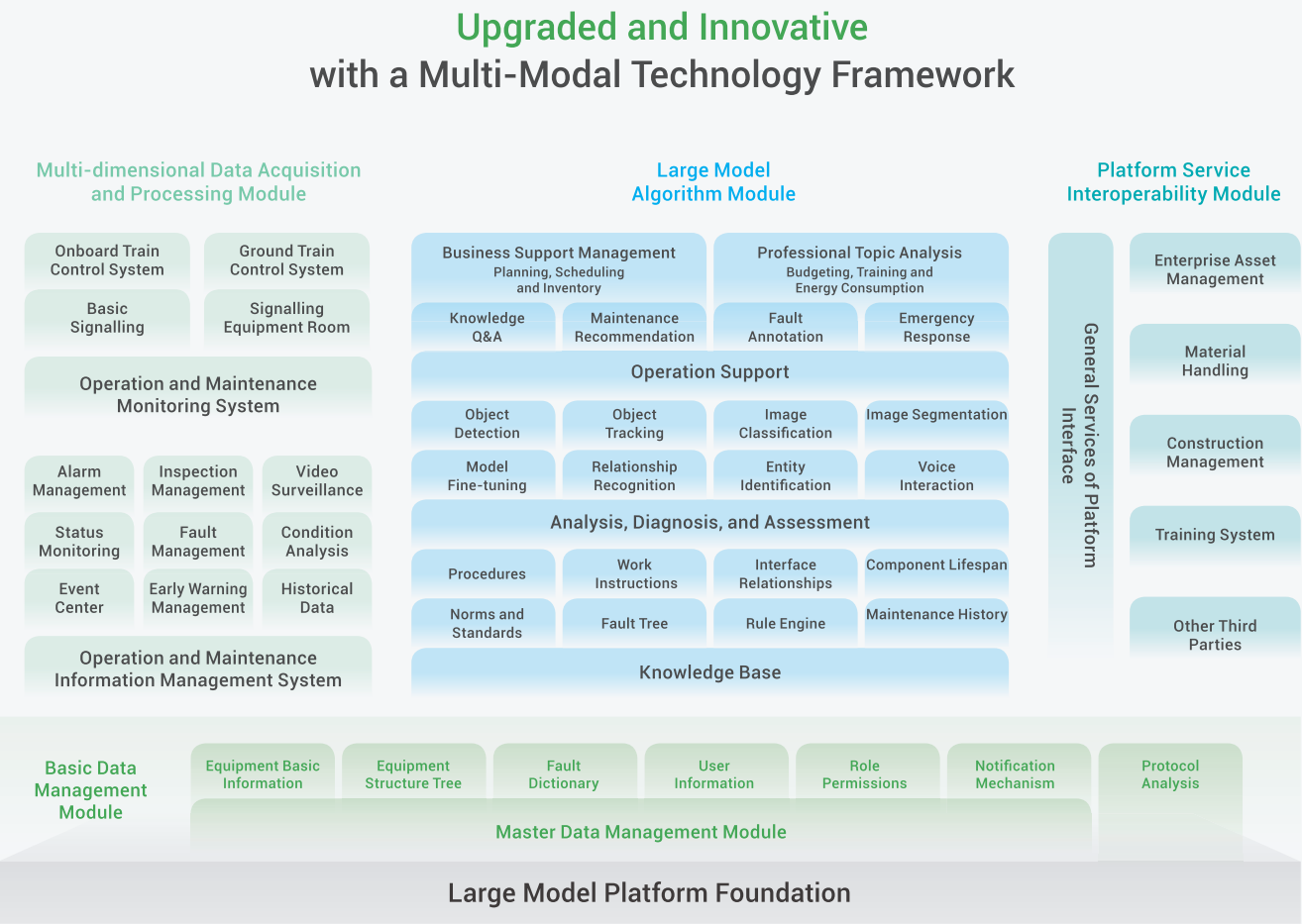
Dedicated Knowledge Base
Develop a rail transit industry knowledge base and knowledge graph powered by large models

Intelligent Empowerment
Cross-modal processing of unstructured text, images, and audio-video data for comprehensive understanding and analysis

Tailored Solutions
Tailored solutions for specific fields, lines, and station sections

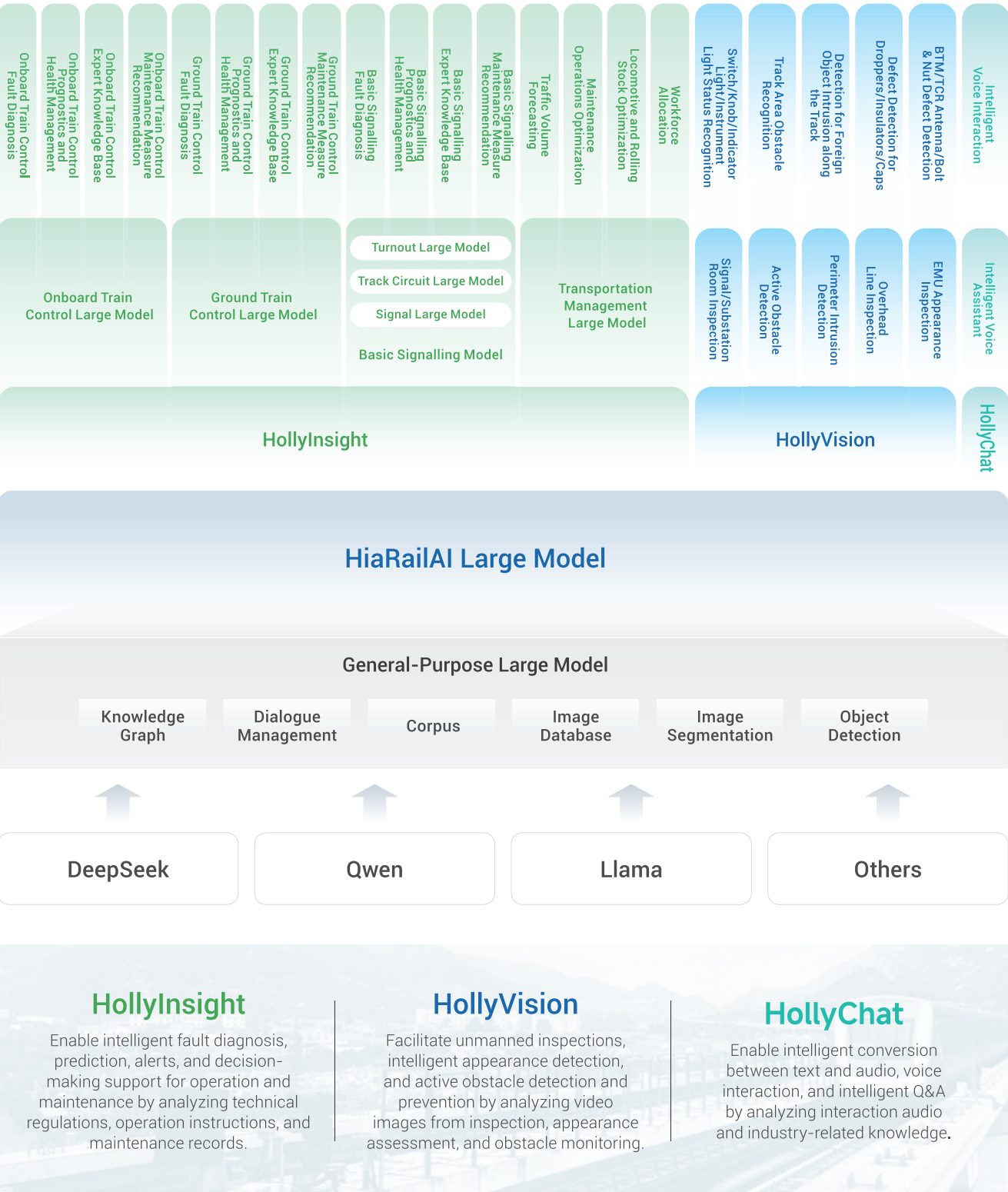
Continuous Iteration
Ongoing interactive learning with real-time updates and enhancements to continuously improve service quality

Product Architecture



Over 30 Years of Industry Expertise with a Strong Railway Background
Built on Expertise, Rooted in Practice, Transforming the Industry

Built on a foundation of general-purpose large models
and fine-tuned with industry-specific data.
HiaRailAI — Born for Deeper Rail Transit Insights



HollyInsight

Rooted in full lifecycle operation and maintenance scenarios
Enhance operational efficiency and enable smarter decision-making

Onboard Train Control Large Model

The Onboard Train Control Large Model is built upon the HiaRailAI foundation, leveraging technologies such as multi-modal sensing, machine learning, image recognition, automated inspection equipment, and the Industrial Internet of Things for onboard systems. It enables full lifecycle data management of onboard equipment, supports end-to-end automation of operation and maintenance processes, and establishes a comprehensive system for train monitoring, early warning, and health management. As a result, it significantly improves operational efficiency and reduces maintenance costs.



Product Functions

- Unified Real-Time Monitoring of Critical Equipment Status
- Remote Real-Time Download of Onboard Train Control Data
- Automated Detection of Maintenance Checkpoints
- Automated Fault Diagnosis
- Expert Case Database Offering Maintenance Guidance
- Multi-Dimensional and Multi-Cycle Analysis Reports
- Detection of Potential Equipment Risks
- Full Lifecycle Management of Equipment

Product Advantages

- Reduce manual maintenance frequency
- Enhance workshop production efficiency
- Improve risk identification capabilities
- Optimize maintenance strategies
- Facilitate sharing of maintenance knowledge

Ground Train Control Large Model

The Ground Train Control Large Model collects real-time operational data from systems such as Train Control Centers, Temporary Speed Restriction Servers, and Radio Block Centers. Built on the HiaRailAI foundation, it automatically captures and analyzes fault codes to prevent missed fault reports, enhance inspection quality, and reduce inspection costs. With an integrated expert knowledge base, the system performs automatic fault analysis and recommends handling measures, significantly improving fault resolution efficiency and professionalism. Through advanced model-driven analysis, it supports health management and preventive maintenance, further enhancing equipment reliability.



Product Functions

- Download and Display of Ground Train Control Data
- Automated Fault Data Diagnosis
- Train Control Data Operation Monitoring
- Closed-Loop Fault Management

Advantages

- Remote inspection reduces labor intensity
- Automated diagnosis assists staff in operations
- Data monitoring alerts for safety risks
- Data analysis unlocks data value

Basic Signalling Large Model

Turnout Large Model

The Turnout Large Model utilizes a dynamic and static force detection system to continuously collect real-time stress data at key traction points of the turnout. This data collection occurs across all operational states, including switching, train passing, idle, and maintenance adjustment. The system integrates expert knowledge and known fault categories from the fault knowledge base. This integration allows it to perform classification reasoning, enabling fault diagnosis, predictive maintenance, and health management of turnouts. It provides maintenance recommendations and repair methods, ensuring operational safety and enhancing efficiency.

Product Functions

24/7 real-time quantitative monitoring of turnout closure

Correlation monitoring of traction points across switching, train passing, idle, and maintenance states

Real-time playback of historical stress pre-alarm data

Precise analysis of turnout switching processes

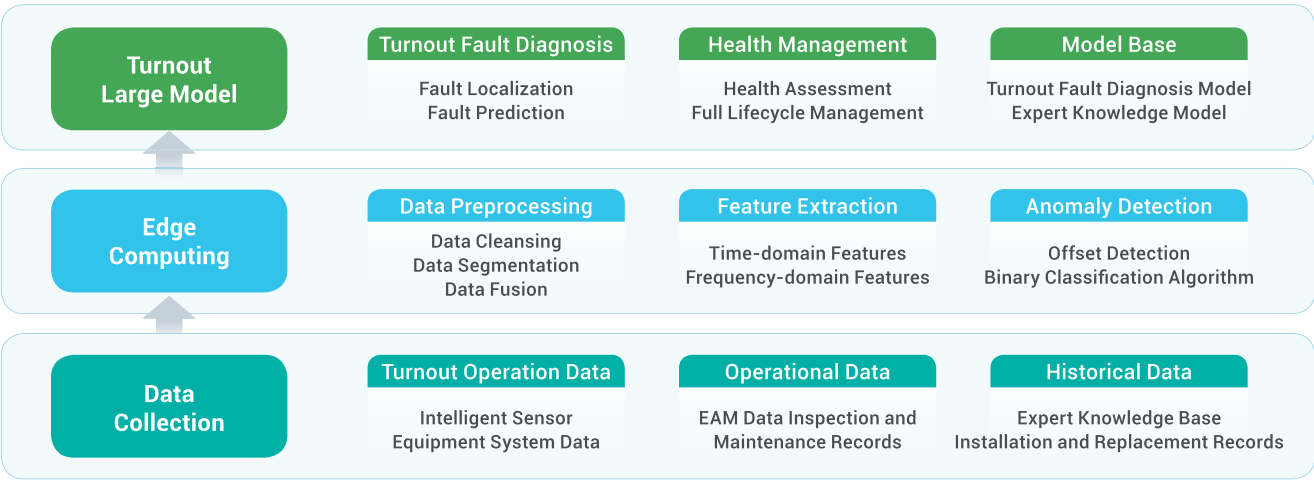
Collaborative analysis of multiple turnouts

Real-Time Stress Curve

Multi-Turnout Real-Time Curve

Pre-Alarm Curve

Historical Curve



Product Advantages

Wide Applicability

Support the installation of drive rod connectors for switches such as S700K, ZDJ9, and ZY7. Compatible with direct replacement and installation of tightness adjustment shims for the locking frame.

Enhanced User Experience

The software interface provides rich information, real-time force curve plotting, precise alerts for limit breaches and anomalies, along with cause analysis and handling suggestions. The system supports multi-device and multi-dimensional comparative and trend analysis, enhancing usability and flexibility.

High Reliability

Adopt comprehensive anti-interference ripple filtering technology in both software and hardware to accurately reproduce resistance data curves.

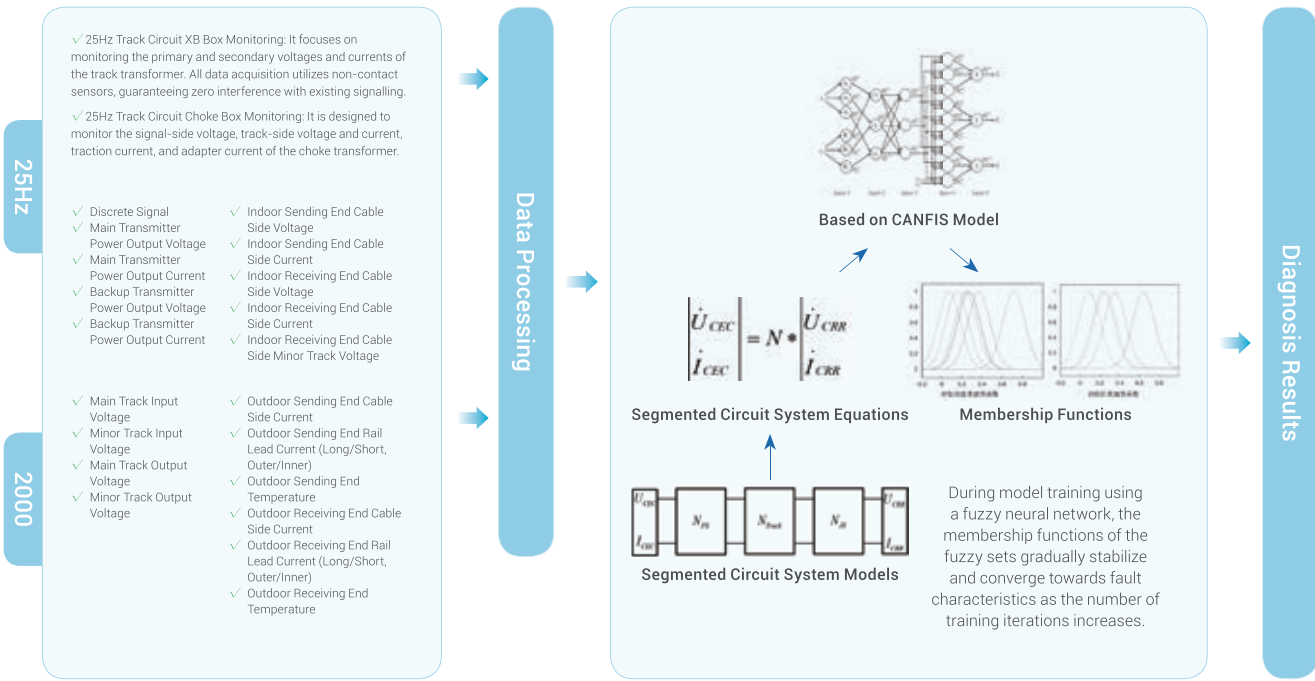
High Safety and Maintainability

The system is equipped with self-safety detection functions, capable of identifying equipment detachment, loose installations, and device malfunctions to ensure operational safety.

Intelligent Diagnosis

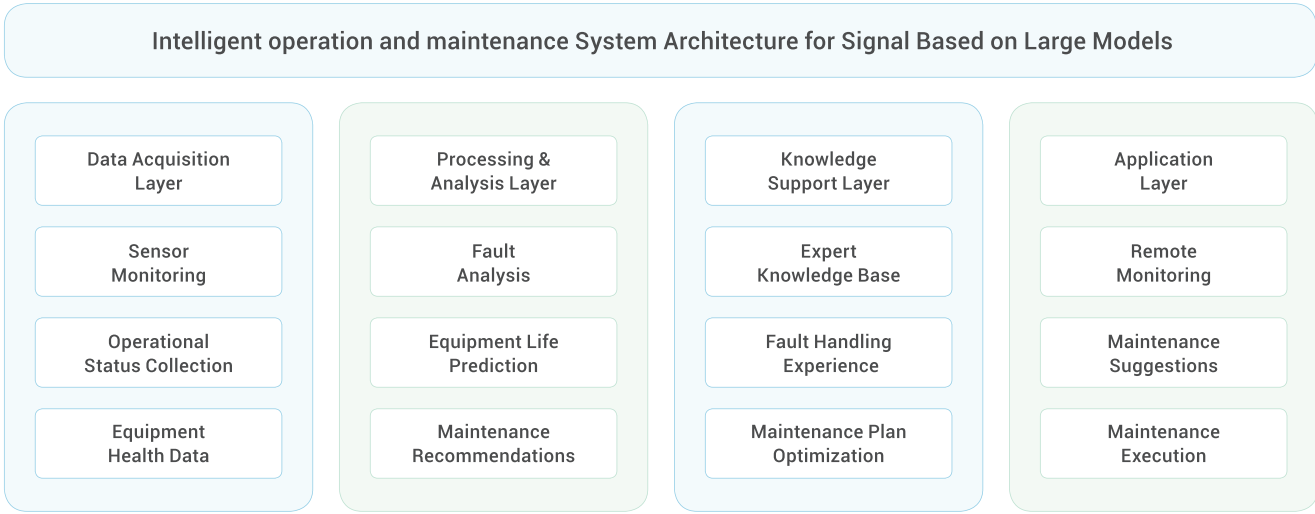
The system independently extracts turnout switching resistance and tightness force net values based on force measurement curves. The system leverages big data intelligent algorithms and an expert rule base to perform diagnostic analysis. It continuously issues early warnings regarding fault scope and severity, and provides real-time maintenance recommendations.

Track Circuit Large Model



The system integrates large models, big data technologies, and mechanistic models of track circuit equipment. It leverages offline learning of historical data, such as technical regulations, operation manuals, and fault maintenance records, combined with real-time monitoring data, including voltage and current. This enables real-time fault diagnosis, trend prediction, and safety warnings.

Signal Large Model



The Signal Large Model integrates advanced deep learning technologies with real-time data analysis to enable intelligent operation and maintenance of signal equipment. Its functions encompass intelligent fault analysis, lifespan prediction, expert knowledge base support, and maintenance recommendation strategies. These features significantly enhance the operational reliability and maintenance efficiency of signals. This system not only helps extend equipment lifespan but also improves the overall quality and effectiveness of maintenance operations through knowledge sharing and personalized maintenance recommendations.

HollyVision

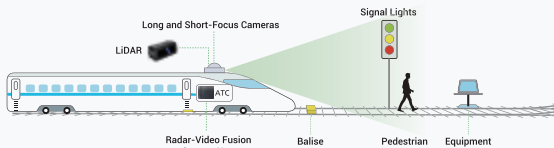
Multimodal Data and Image Recognition
AI-Powered Vision
— Sharper, Broader and Easier

Active Obstacle Detection



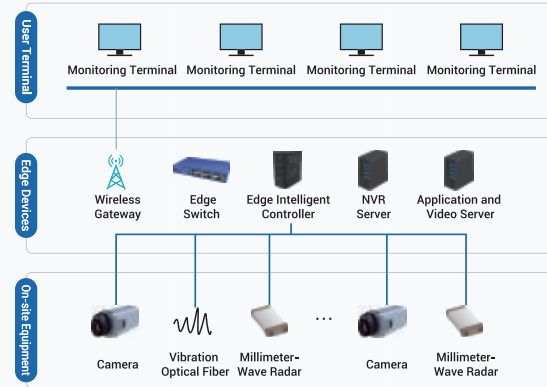
Personnel Identification

Vehicle Recognition



By equipping the train front with long and short-focus cameras, LiDAR, and other sensors, the system accurately identifies track areas. It monitors foreign object intrusions in real-time and promptly alerts drivers to take action. It supports interfacing with external systems such as ground perception and satellite positioning, enabling long-range obstacle detection and protection.

Perimeter Intrusion Detection



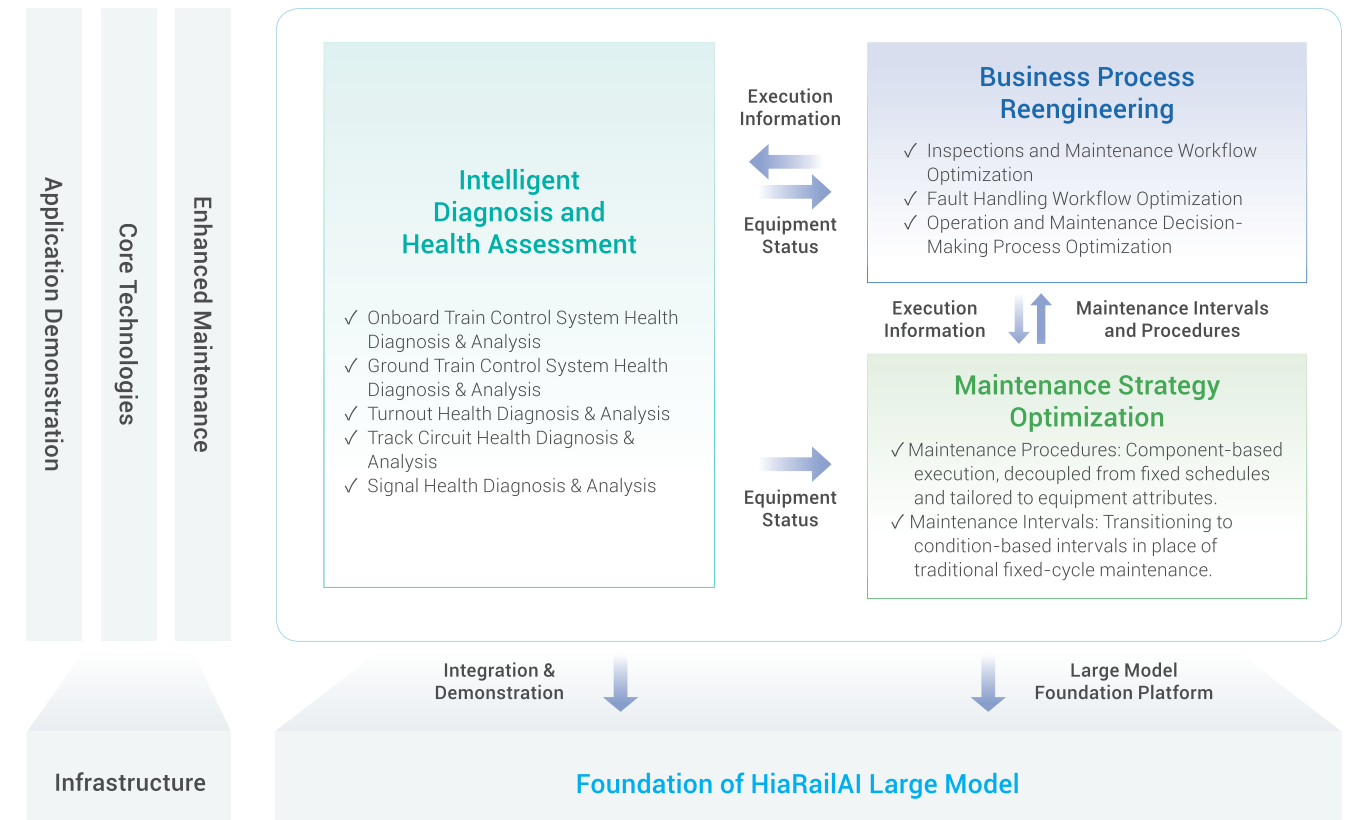
The solution adopts an advanced cloud-edge-end system architecture. It leverages multi-sensor fusion technologies, including cameras, radar, and vibration optical fibers, for all-weather, real-time automated monitoring along railway lines. This offers an effective alternative to manual inspections and significantly improves operational efficiency.

Application Scenarios

Smart Railway operation and maintenance

Digitalized, Intelligent, and Efficient

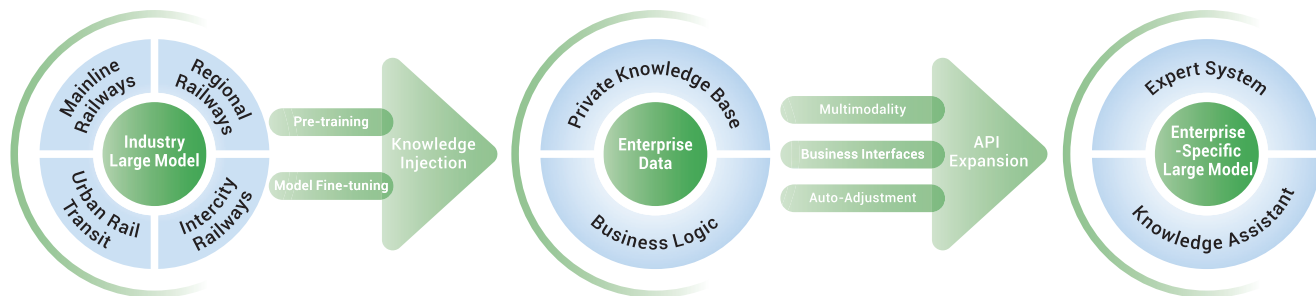
The smart railway operation and maintenance solution encompasses intelligent maintenance systems, diagnostic platforms, unmanned inspection systems, smart maintenance bases, and safety protection solutions. It aims to safeguard equipment, streamline management, and enhance operational efficiency through advanced technologies.



HollyChat

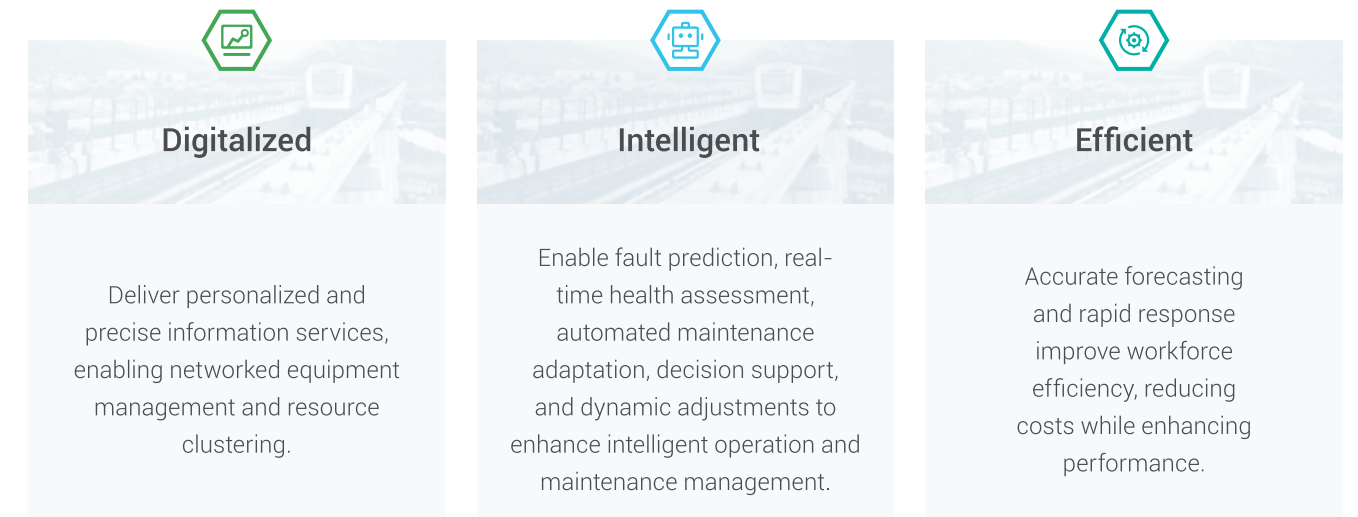
Trained on Industry-Specific Knowledge Bases, Offering Instant Q&A
Your Smarter Assistant for Evolving Operations & Maintenance

Intelligent Voice Assistant



Leveraging HollySys' self-developed operation and maintenance large model and digital twin technology, the system delivers fault localization, maintenance recommendations, intelligent enterprise knowledge retrieval and optimization, as well as fault data archiving. This enables more accurate diagnosis, efficient handling, and simplified operations and training.

System Advantages



Railway Unmanned Inspection

Smart Inspection for Assured Safety

The railway unmanned inspection system leverages advanced technologies, including robotics, multi-modal sensing, image processing, and artificial intelligence. It also utilizes the Industrial Internet of Things and expert systems. It can automate equipment inspections at signal relay stations, enhance security monitoring, manage environmental controls, and provide fire alarm detection. Additionally, it oversees spare parts inventory and enables alarm linkage control. This comprehensive approach facilitates unmanned railway inspections, ensures operational safety, and significantly improves maintenance efficiency.

System Functions

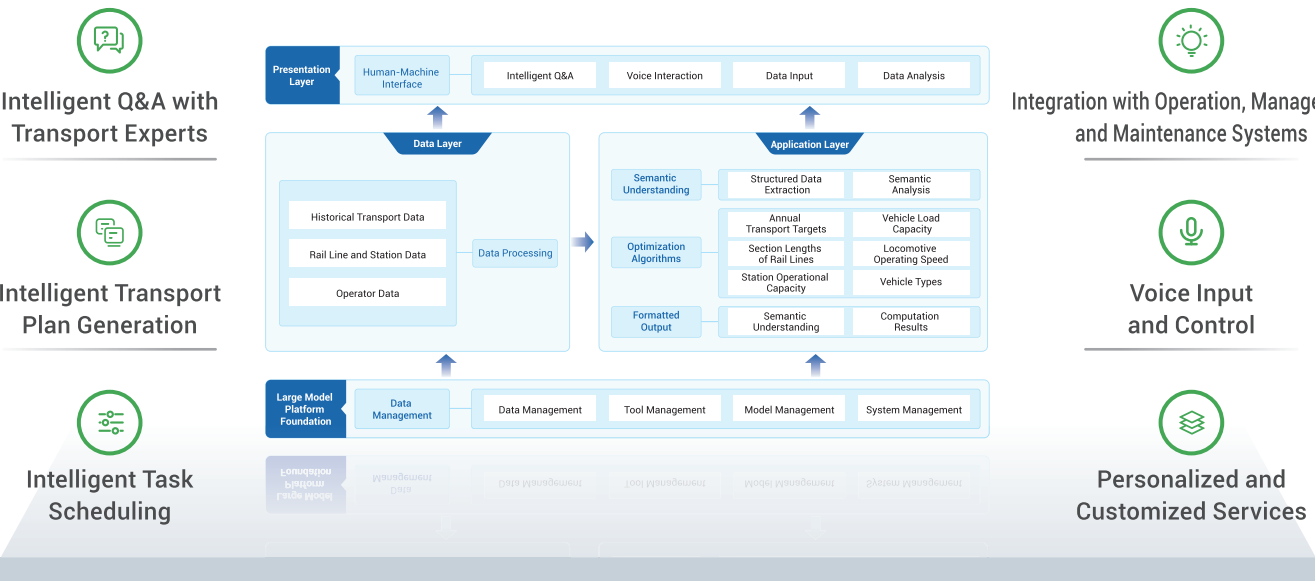


Railway Transportation Management

Smart Planning for Lean Transportation

The Transportation Management Large Model Decision Support System is an intelligent transport management platform that integrates multiple key functional modules. Through autonomous data management and decision-making support, the system intelligently formulates, adjusts, and optimizes transport plans by comprehensively considering various influencing factors. This ensures efficient, safe, and reliable operation of the transport system. Additionally, it supports private deployment, effectively safeguarding enterprise and user data independence and security. This empowers companies to achieve smarter and more refined transport management.

System Functions



System Advantages Comparison

Type	Current Situation	After System Deployment
Timeliness	Manual inspection once or twice daily, resulting in poor timeliness	Conducts scheduled periodic inspections with real-time alerts, ensuring high timeliness
Safety	Close-range manual operations with low safety levels	Intelligent monitoring via smart devices and analytical algorithms, enhancing safety by eliminating close human contact
Result Objectivity	High reliance on human factors, leading to potential misjudgments and omissions	Machine learning provides diagnostic recommendations with comprehensive coverage and image recognition accuracy over 95%, ensuring objective results
Operation and Maintenance Management Level	Fully dependent on managerial oversight	Fully digitalized operation and maintenance management
Traceability	Poor traceability	Real-time image and video storage with on-demand access and playback, ensuring verifiable outcomes
Data Interconnectivity	Isolated systems across departments, low resource reuse, causing inefficiencies	Unified management of systems and devices for data sharing
Early Warning Capability	Early warnings based on manual experience, requiring high expertise from inspectors	Long-term data accumulation builds databases, enabling trend analysis and intelligent early warnings

System Advantages

