

# Building AI's Pervasiveness throughout Rail with AI-enabled Video Analytics Platforms



A line of EN 50155 compliant AI-enabled platforms offer rail solution providers with a high level of flexibility to select the configuration best suited to their use cases, and help them achieve railway digital transformation

## AVA-5500

*Rugged, fanless AIoT platform with NVIDIA Quadro GPU embedded for real-time video/graphics analytics*



## AVA-5600

*19" 2U rackmount rugged, fanless AIoT platform with high performance GPU for compute-intensive applications*



## AVA-RAGX

*Compact, fanless AIoT video analytics platform with NVIDIA Jetson AGX Xavier for SWaP-constrained deployments*



## CompactPCI Platforms

*Complete solutions consisting of high performance CPCI-S.0 processor/carrier blades, NVIDIA MXM GPU modules and CompactPCI systems*



CompactPCI Serial Processor Blades



MXM GPU Modules



CompactPCI Systems


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# ADLINK



## How AI Is Transforming the Rail Industry

**T**oday's artificial intelligence (AI) powered systems and applications boost productivity and safety across transportation sectors, including the railway.

The rail industry has long needed modernisation, particularly in autonomous operation, which is made possible through AI. In order to compete with the transition

to autonomous vehicles in road transportation of both cargo and passengers, the rail industry needs to integrate AI into its modernisation to benefit areas of operation.

### Contributing Trends and Factors

Legacy onboard and wayside systems have worked for decades and continue to do so. However, the nature of competition and

the need for growth makes AI as attractive to the railways as every other industry. Organisations adopting AI can expect an uptick in revenue, including AI-driven revenue increases, and reduced costs. AI stands to give the railways an aggressive bottom-line boost. However, other complementary trends and factors also make AI adoption well-suited to the railways.

### Smaller Form Factors

In the rail industry, space is limited,

so the physical dimensions of computing infrastructure can be key. The rise of AI within the rail industry is due in part to today's computer systems moving to smaller form factors and being much more powerful and space efficient, allowing the integration of AI.

### More Data from the Masses

The amount of data produced in the rail industry continues to grow exponentially from devices and services, such as sensors, smart phones and servers. This volume of data gives ample reason to use AI in rail to improve efficiency, safety, customer approval, and profits.

### The Internet of Things + M2M

Internet of Things (IoT) and machine-to-machine (M2M) devices generate large amounts of data for AI analysis, including logs, alerts, time stamps, and video — much of them mission-critical for rail. M2M are a subset of IoT devices that

communicate directly with other connected services.

### Boost from GPU

GPU-powered deep learning accelerates the performance of neural network systems. By incorporating GPUs into compatible platforms, rail companies can run AI-based workloads and applications at speeds practical for near-real-time utility.

### Pandemic Protection

By using AI, rail station and on-train surveillance feeds can be monitored for face mask usage and other health & safety guideline compliance, flagging potential human-based hazards, reducing risk, and protecting the public.

## Potential AI Applications for Rail

AI is a new, rapidly evolving technology and its prevalence

and influence in the rail industry are growing. The following are examples of AI applications to expect within this market.

### AI-Powered Customer Service

From chatbots on social media to humanoid robots servicing high-traffic stations, AI will dominate how customers get their questions answered. AI-based technologies such as speech-to-text and natural language processing will provide answers in real time at lower costs freeing up staff members to address other needs.

### Automatic Train Operation (ATO)

Rail autonomy with increasing degrees of driving and operating responsibilities transferred from a human crew to an operational safety enhancement system is already in use in several countries. With improved AI-automated rail systems, rail transport will benefit from better rail synchronisation thanks to real-time information and data exchange.

### Biometric Ticketing

Ticketing based on biometric data including body scans (facial, fingerprint, vein, and retina recognition) and voice verification will streamline onboarding processes and bolster security. AI algorithms accelerate biometric pattern processing and increase accuracy.

### Crowd Control

Face and crowd detection video analytics monitoring ticketing and boarding locations improve staffing efficiency, security management, and traveller safety.



## Delay-Time Prediction

Delays can be expensive for rail companies and annoying to customers. By analysing historical data, an AI-powered system can predict how long a delay is likely to last and inform rail operations and customers.

## Freight and Infrastructure Monitoring

AI combined with IoT will improve how freight rail companies monitor their facilities, assets, systems, and shipments in real time. Metrics like network velocity, labour utilisation, delay avoidance, productivity and customer satisfaction will improve.



## Rail Usage Pricing

AI can enable a real-time market for rail usage rights, letting supply and demand dictate pricing and utilisation of routes. Rail operators could offer unused rail space to other parties, optimising transport resource management.

## AI and ADLINK: The AVA Series

Built and certified for the rail industry, the ruggedised, fanless ADLINK AVA Series is a line of graphics engine-focused COTS platforms. The AVA family leverages ADLINK's Elite partnership with NVIDIA to create AI-powered solutions specially designed to help rail solution providers achieve digital transformation, and differentiate their rail-specific applications such as:

- Passenger information systems
- Railroad intrusion detection
- Train station surveillance
- Onboard video security
- Railroad hazard detection

The AVA line offers integrators a range of configurations to suit their use case. ADLINK's AVA-5500 is powered by 6th/7th Gen Intel® Core™ i7 Processors and MXM 3.1 Type A/B module based on NVIDIA® Quadro® Embedded RTX 3000. This CPU/GPU combination can drive higher levels of AI computing in applications such as predictive analytics and facial recognition. An EN 50155-compliant platform, the AVA-5500 follows strict guidelines, ensuring its certification for use in a variety of rail system environments.

The ADLINK AVA-5600 packages the primary components of the AVA-5500 in a 19" 2U chassis for rackmount deployment and steps up to NVIDIA Quadro RTX 5000 MXM graphics. The RTX 5000 has a larger power profile than the RTX 3000 (110W vs. 80W), and supports 16GB of RAM compared to 6GB, making it a better fit for more GPU-intensive applications.

Powered by a low power consumption high performance NVIDIA Jetson AGX Xavier module,

the ADLINK AVA-RAGX rounds out the AVA Series by addressing the needs of deployment in space-restricted environments. The AVA-RAGX measures just 288x190x72mm yet still offers the required I/O ports for railway applications. Beyond EN 50155 compliance, the AVA-RAGX adds support for smart ignition control, which helps prevent data loss or corruption due to improper system shutdown.

## Conclusion

AI will not only benefit rail businesses, but also the passengers who rely on rail systems for travel, work, and commerce. ADLINK's AVA Series of COTS platforms, with its compute power, ruggedness, compact size, and reliability, are AI-ready solutions that will modernise the rail industry today.

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