The Applications and Reference Design of Railway Rolling Stock in Transportation Systems

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OVERVIEW

Transportation systems which include all modes of transportation, for example, aviation, maritime, highway, railway and pipeline, etc, are a vast, open, interdependent networked system that moves millions of passengers and millions of tons of goods. Transportation systems aim at providing technology and communications that allow safe, prompt, convenient, comfortable, efficient, and friendly travel for all commuters. The rising and flourishing of transportation industry brings all kinds of applications in transport facilities. With the swiftly growth of transportation and the gradually frequency of rail and road traffic, how to reduce operating costs, decrease fuel use, minimize downtime, increase safety and improve environmental performance will be an important topic.

The transportation is a combination of infrastructure, vehicles and operations. Along with technical progress, people start to use Advanced Management Technology (AMT) Systems to monitor and manage the ongoing traffic congestion in a better way. Axiomtek provides complete embedded system platforms and integrates them for you. With Axiomtek's transportation solutions, users not only save on integration costs, but also improve time-to-market.

RAILWAY ROLLING STOCK

Railway rolling stock comprises of all vehicles that move on a railway. Usually, it includes both powered and unpowered conveyances. However, in some countries, the term is used to refer only to unpowered conveyances, specifically excluding locomotives which may be referred to as running stock, traction or motive power. This heavy-duty transportation of vehicles requires accurate timing, reliable and consistent system platform.

Railway rolling stock applications involve three major systems: Mobility Control Unit, Passenger Information System and Network Video Recorder. Each system can be automatically monitored by control center. Axiomtek's industrial networking and embedded devices integrates a variety of I/O ports to support different interfaces to enable video, voice, and data transmission needed for passenger entertainment, emergency intercoms, and video surveillance.

BUSINESS CHALLENGES

Railways are an environmentally friendly methods of transport well suited to modern society. However, noise and vibration are key obstacles to further development of the railway networks for high-speed intercity traffic, for freight and for suburban metros and light-rail. Railway facilities need to operate reliably in the most extreme ambient conditions, so all the railway products should be resistant to dust, shock, vibration, fire and extreme temperatures. Railway equipment that is being installed close to passengers should meet additional requirements for noise, safety and comfort.

When train speeds increase, the intensity of railway-generated noise and vibration generally become higher, presenting major environmental problems. Since operating train speeds are gradually increasing in all countries and this trend is likely to continue in the future, the knowledge and understanding of possible noise and vibration effects is vital to undertake possible mitigation measures.

Public safety and system stability are the highest concerns for any company in the transportation field. Axiomtek's industry-leading embedded systems comply with strict railway standards, can operate in extreme temperatures, feature powerful computing performance and offer various peripheral interfaces that provide high-reliability for transportation applications.

Railways could be under threat from extreme weather conditions. Wet winters, hot dry summers, icy rains and strong winds damaged railway rolling stock. Weather-induced disruptions cause considerable threats to supply reliability and competitiveness of environmentally friendly rail freight transport. To effectively combat

weather-induced disruptions, better understanding of the interactions between transport operations and weather conditions is needed.

TECHNOLOGY SOLUTIONS

➢ **EN50155, EN50121, EN45545 Certificates**

The top priority of rail transit is to ensure system stability and passenger safety. Axiomtek's railway rolling stock transportation embedded systems are ideal for rugged & space critical transportation applications certified with EN5.0.1.5.5, EN5.0.1.2.1 and EN4.5.5.4.5 help you build a management system easily and quickly.

➢ **Incredible Fanless Design and Great Computing Power**

Axiomtek's tBOX320 is a fanless embedded computing system incorporating high performance Intel® Core™2 Duo SP9300 processor at 2.26 GHz with Intel® GM45 Express chipset. Built for rugged working environments, the outstanding industrial design gives tBOX320 the advantages of fanless operation and ruggedize form factor ideal for modern transportation applications such as fleet management, highway and railway roadside system and toll system.


➢ **Rugged Design and Wide Range Temperature Support**

Designed with IP40-rated dust-proof enclosure in a rugged profiled-aluminum case and can operate in critical environments with temperature ranging from -25°C to +55°C, this railway-centric embedded box computer has built-in Intel® Core™2 Duo SP9300 processor and supports up to 2 GB of DDR3 800/1066 memory. The integrated graphics chipset offers 256MB of memory, DirectX 9 3D as well as HDTV support and the integrated MPEG2 and H.264 decoders reduce processor load while displaying HD video.

INTELLIGENT DESIGN OF AXIOMEK tBOX320 SYSTEM

✧ Stability with onboard Processor and DRAM
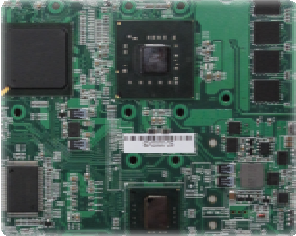
Axiomtek tBOX320 adopts an onboard processor and onboard DRAM which greatly reduces the impact of vibration and shock ideally for railway fields. To prevent ESD and over-voltage, this compact-size system is equipped with 4 isolated RS-232/422/485 ports and 1 isolated digital I/O connector for offering excellent power protection.

✧ Security and System Reliability

Considering to the system reliability, robust M12 interface connector for 2 Gigabit Ethernet ports and other lockable or screw I/Os also can keep all cables tightly secured. It is ideal for railway application.

### ✧ User-friendly and Easy Maintenance

Axiomtek tBOX320 reserved one swappable 2.5" SATA 300 hard drive bay, and one internal SATA drive bay as well as the slot for Compact Flash media which are easily accessible from the front.

✧ Greater Expansion Capability and Communication

For greater expansion capability, 2 internal PCI Express Mini Card slots are added to the system. One SIM slot is also available for 2G/3G/4G, GPS, WiFi and Bluetooth applications.

By receiving certification and compliance, Axiomtek's rugged embedded box computer helps OEMs accelerating their time to market and reduce hardware design costs for their railway applications.
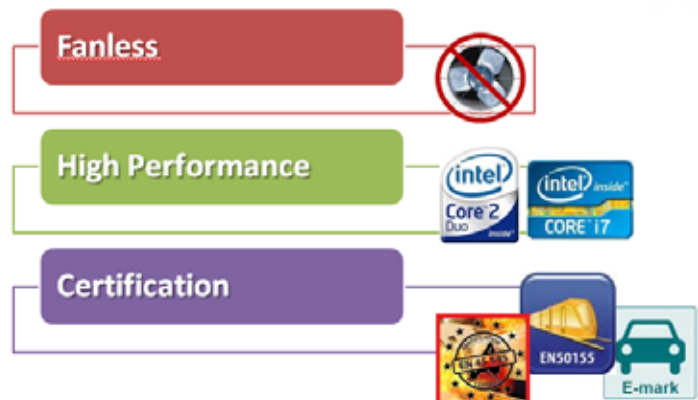
OBTAIN THE BENEFITS NOW!

Take Axiomtek's tBOX320, you can obtain the following significant benefits immediately!

- EN50155, EN50121 and EN45545 certified embedded system for railway PC
- EN50121-4 and NEMA TS1/2 compliant Ethernet-based products
- High-performance, fanless and industrial-grade hardware design
- Extended temperature range
- Anti-vibration & anti-shock design
- Robust M12 interface connectors for gigabit ethernet ports and power input
- Isolated features for COM ports, digital I/O, power supply
- Three internal Mini-PCI Express slots for greater expansion capability
- One SIM slot for 2G/3G/4G applications
- Fast recovery time and isolation protection
- Wide range of power inputs
- Rapid wireless roaming
- Supports various mounting options for optimal space utilization
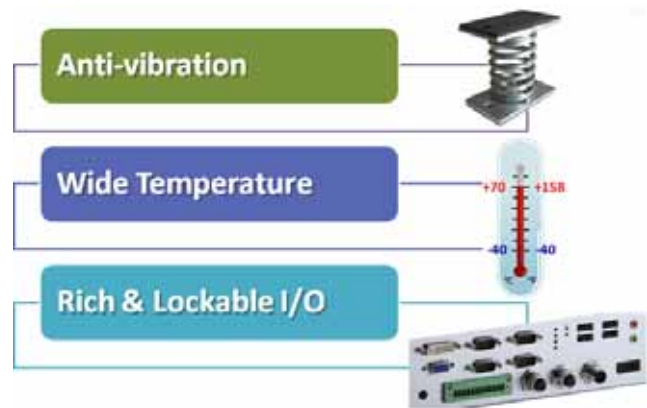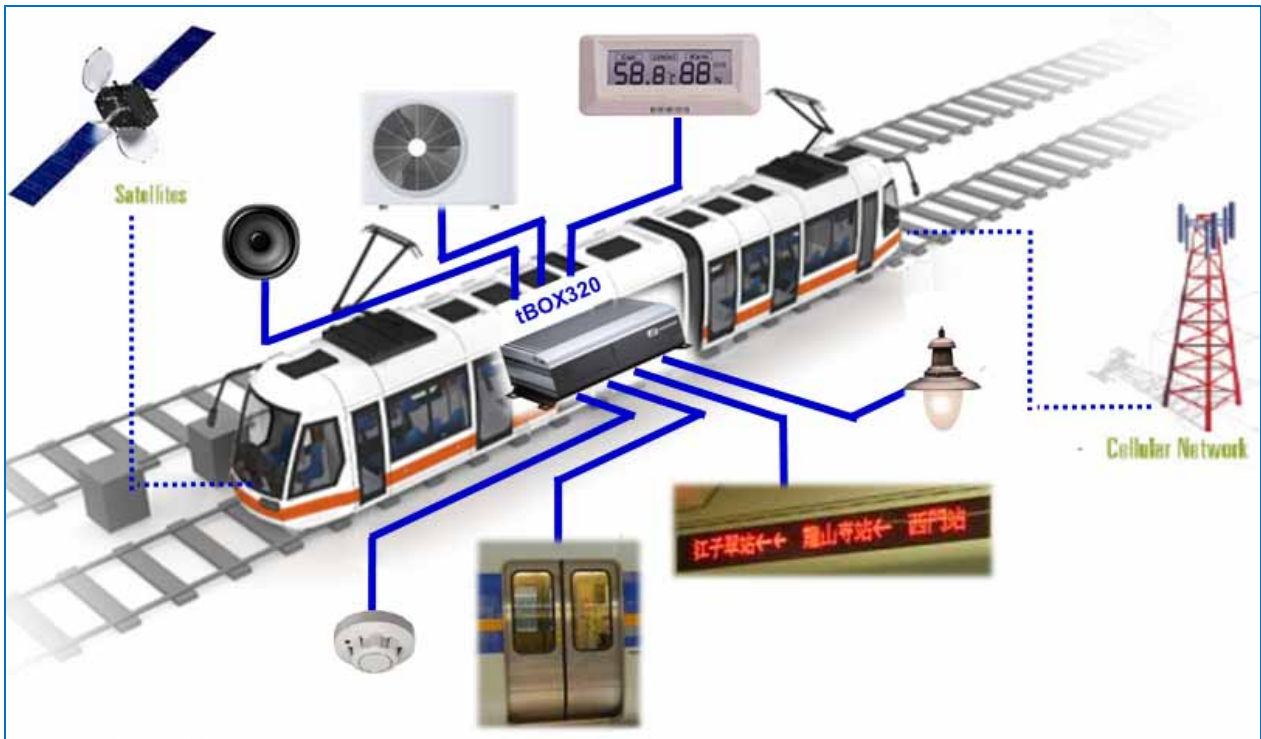
APPLICATIONS

Rolling stock applications involve three major systems: Mobility Control Unit, Passenger Information System and Network Video Recorder. Each of these systems can be automatically monitored by the control center.

In the application of Passenger Information System & Network Video Recorder, each IP camera sends its video to tBOX through Power over Ethernet switch. Data can be transferred to the control center via 3G/GPRS or WiFi without moving the tBOX320. Information or messages which have been delivered to the tBOX320 by control center through 3G/GPRS or WiFi before departure can be shown on display.
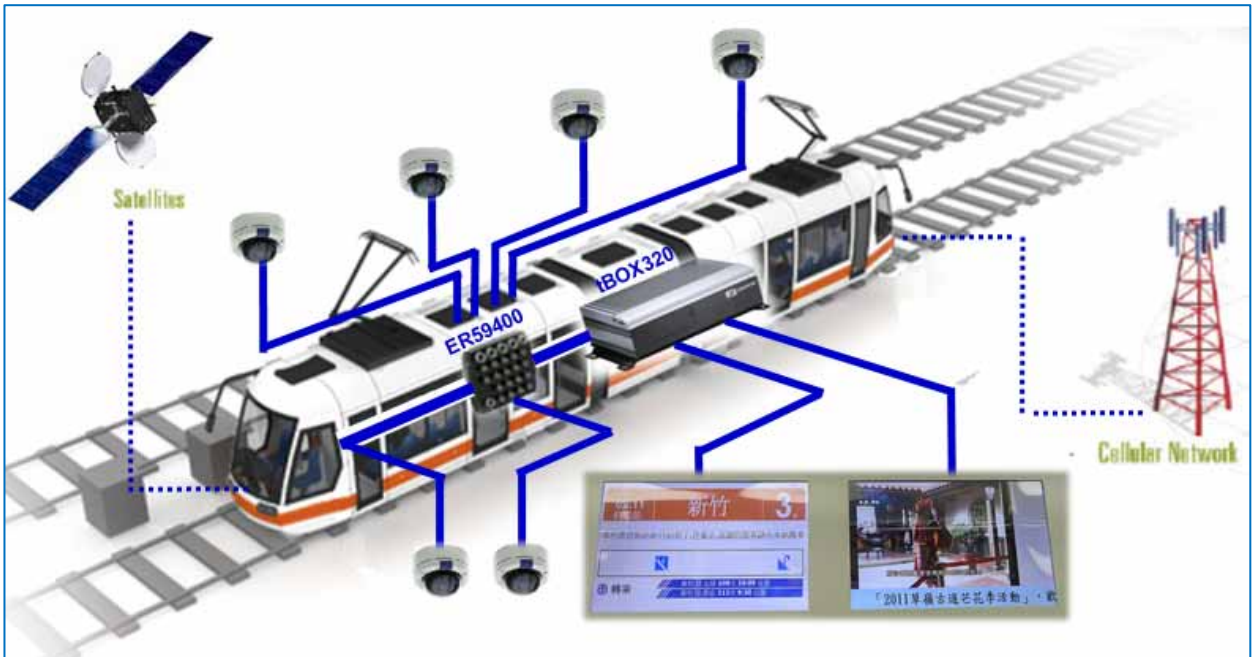
Railway rolling stock comprises of all vehicles that move on a railway. This heavy-duty transportation of vehicles requires accurate timing, reliable and consistent system platform. Each of the system can be automatically monitored by the control center.

In the application of Mobility Control Unit, Axiomtek's tBOX320 is a full-featured, comprehensive embedded system which integrates a variety of I/O ports to support different interfaces to enable video, voice, and data transmission needed for passenger entertainment, emergency intercoms, and video surveillance. All peripherals can be controlled and managed through tBOX320.

The transportation is a combination of infrastructure, vehicles and operations. Along with technical progress, people start to use Advanced Management Technology Systems to monitor and manage the ongoing traffic congestion in a better way. Axiomtek provides complete platforms and integrates them for you. Axiomtek has advantages in vehicle hardware, certification and design capability, and the ability to provide a reliable rolling stock factor solution.

About Axiomtek Co., Ltd

Axiomtek Co., Ltd. is one of the world's leading designers/manufacturers of PC-based industrial computer products. From its roots as a turnkey systems integrator specializing in data acquisition and control systems, Axiomtek has mirrored the PC evolution in various industries by shifting its focus toward the design and manufacture of PC-based industrial automation solutions.

Axiomtek was established since 1990. It has 475 employees in headquarters and over 110 employees in subsidiaries including USA, China, and Europe. More than 60 distributor partners around the globe have appointed. Axiomtek offers IPC, Embedded Boards and SoM, Rugged Embedded System and Platforms, Touch Panel Computers, Medical Panel Computers, Digital Signage & Displays, Industrial Networking & Converters, and NA product lines with more than 400 items.