CAPABILITY BRIEF

Autonomous Mining Vehicles

BEST-IN-CLASS CONNECTIVITY TO SIMPLIFY AUTONOMY

HIGHLIGHTS

Elevates mining operations through data-centric designs that leverage the data to control and optimize critical operations in real-time

Transforms mining operations with autonomy by delivering a future-proof connectivity architecture

Reduces cost and risk with the leading architecture solution for autonomous vehicles, enhancing project efficiency and vehicle safety and security

Optimizes system performance with best-in-class connectivity for both on-board and off-board systems

Enables a modular design that simplifies the process of adding AI, teleoperation and security as needed, without the need to upgrade all applications at once

The ability to support autonomous operation is now a design requirement for any new vehicle that is expected to operate in today's mines. Ideal for solving both existing and evolving autonomy needs, RTI and Connext Drive® successfully support critical mining operations requirements by simplifying system architecture and connectivity. Our approach has been proven in 2,000 customer designs and used in autonomous mining vehicles deployed around the world.

ELEVATE OPERATIONS

Autonomy thrives on data. Therefore, autonomous systems require the transmission of this data to be robust and reliable to effectively support vehicles in modern mining operations. Real-time data collection, processing and analysis are all essential for enabling vehicles to navigate complex environments and optimize their routes.

Implementing a best-in-class connectivity solution for autonomy can significantly streamline and elevate mining operations to stay competitive in a fast-moving industry. When it comes to making split-second decisions, a data-centric approach using Connext Drive helps ensure that mining operations always have instant access to the latest information, enhancing safety and operational efficiency.

High-quality connectivity from RTI allows autonomous vehicles to communicate seamlessly with central control systems and each other, enabling coordinated movements and avoiding potential bottlenecks. This real-time responsiveness is central to maintaining smooth operations, reducing downtime, and quickly adapting to changing conditions on the ground. With enhanced connectivity, operators can monitor vehicle performance remotely, conduct predictive maintenance and make informed decisions that keep operations running smoothly and efficiently.

Best-in-class connectivity creates a platform that:

- Enables new business models, such as Transport-as-a-Service (TaaS), by allowing mining operations to adapt more readily to market changes and customer demands.
- Paves the way for electrification through autonomous electric vehicles (EVs) that rely heavily on advanced connectivity to manage battery usage and charging schedules and optimize energy consumption. A robust connectivity infrastructure supports these requirements, ensuring that EVs can operate effectively and contribute to greener and more sustainable mining operations.

BUILD FOR THE FUTURE

In a competitive industry such as mining, anticipating and planning for future needs is essential. Adopting a modular architecture can provide a highly adaptable foundation to

ensure that systems are not only robust, but also flexible and scalable. Modular design allows operators to easily add, modify and grow systems as needed, accommodating new technologies and adapting to changing operational requirements without significant overhauls, which is an important advantage that the data-centric connectivity of Connext Drive provides. This flexibility is crucial in a dynamic industry such as mining, where continuous improvement and innovation are vital for maintaining a competitive edge.

To keep pace with the latest technological innovations, operators are increasingly looking to incorporate AI and teleoperations to enhance the capabilities of autonomous mining vehicles. And providing AI systems with real-time data allows them to make more accurate and timely decisions. This real-time data processing enables AI to: optimize routes dynamically; manage energy consumption more efficiently; and predict maintenance needs before they lead to costly downtime. Connext Drive helps ensure that your AI applications get the data they need to reliably and securely improve operational efficiency and safety.

With Connext Drive, users can easily incorporate data security and teleoperations into the architecture to add an additional layer of flexibility and safety, while also allowing remote human intervention when necessary. This ensures that complex or unforeseen situations can be managed effectively by combining the strengths of human intuition and machine precision.

Moving forward, it's important to design autonomous mining systems that are modular and supported by real-time data, both to effectively address current challenges and to future-proof operations. This focus helps accelerate the integration of advanced AI capabilities and next-level security that provide a foundation to ensure sustained growth and innovation. This approach not only enhances operational efficiency and safety, but also keeps operations agile enough to adapt quickly to evolving technological landscapes and market demands.

THE #1 CONNECTIVITY SOLUTION FOR AUTONOMY

RTI provides the #1 connectivity solution for autonomy, and is therefore ideal for supporting complex autonomous mining operations. Proven in thousands of real-world applications, RTI has an extensive track record in delivering robust and reliable connectivity solutions that help significantly reduce costs and risks associated with mining operations. Our solution is designed to help accelerate decision-making, enhance safety and improve overall productivity in today's most challenging mining environments.

USE CASE A

Company A needed to deploy an autonomous road train solution. With RTI Connext®, they were able to build a truck-hardware-agnostic solution that is adaptable to different vehicle models, as well as portable to future platforms. They rely on Connext to move data reliably from a combination of sensors that include LiDAR, radar, cameras, and GPS to the sensor fusion unit. Additionally, Connext Drive allows the solution to maintain connectivity with nodes distributed around the travel path, as well as receive the latest optimal routes with data to control steering, acceleration, and braking. All of these factors help ensure safe and efficient operation. The system also utilizes Connext for real-time communication between vehicles and a central control system, enabling fleet management and coordination.

USE CASE B

Company B needed to build autonomy into its large, off-road hauling truck. With Connext, they were able to use the same standards-based interface to integrate their autonomy application with a back-end monitoring center and a Traffic Management System (TMS). Now, each sub-system speaks the same 'language' and is modular and interoperable, enabling them to support any TMS provider. In addition, the modular, data-centric framework means Company B is ready to provide new solutions and benefits to their customers quickly, and leverage new advances in autonomy and AI technologies faster than the competition.

ABOUT RTI

Real-Time Innovations (RTI) is the infrastructure software company for smart-world systems. Across industries, RTI Connext® is the leading software framework for intelligent distributed systems. RTI runs a smarter world.

RTI is the market leader in products compliant with the Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Silicon Valley with regional offices in Colorado, Spain, and Singapore.

Your systems. Working as one.

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