



How Renovo Helps Unlock The Data Insights of Automotive Systems

At a Glance



Industry Software

Locations United States

Product QNX® Neutrino® RTOS

<https://www.renovo.auto/>

Through onboard software and sensors, a single vehicle may produce tens of terabytes of data in a single day. From ignition to the moment the engine powers down – and even beyond that – every system within the car generates its own massive dataset. These datasets contain potential insights on everything from safety to driver behavior to software, hardware, or design improvements.

As we move towards a future defined by autonomous vehicles and smart cities, car companies need the capacity to retain, process, and analyze this data. Yet they cannot afford to shift their focus away from safety, security, and functionality. Renovo recognizes this.



The organization maintains a firm stance on two things. First, that secure access to the data generated by embedded systems is critical. And second, that the complexity and safety concerns of systems such as Autonomous Vehicles (AVs) and Advanced Driver Assistance Systems (ADAS) are such that key strategic partnerships are fundamental in addressing them.

“I believe that to innovate, a company must narrow down its focus to the core of what it does,” says Chris Heiser, Renovo Co-Founder and CEO. “The corollary of that is the need to find partners and collaborators to help deliver a full solution and fill internal gaps in knowledge and expertise.”

Through its Insight data management platform, Renovo is working to provide the automotive industry exactly that. A means of accessing, organizing, and identifying insights in the data generated by automotive software and sensors. It has partnered with BlackBerry QNX to assist in the development of this platform.

Over a Decade of Automotive Insights

Renovo’s expertise lies primarily in automotive software, edge computing and data orchestration. Co-founded by Chris Heiser and Jason Stinson, it represents the culmination of decades of experience in the automotive and technology sectors. Renovo has leveraged this expertise to great effect, working closely with multiple industry partners for over a decade. In so doing, it has been at the center of several major advances in autonomous vehicles and vehicular software.

In 2008, for instance, the company collaborated with multiple automotive suppliers to create its own electric supercar known as The Renovo Coupe. For Renovo, it was both a learning experience and a proof-of-concept.

“When we built The Coupe, we went through a process of understanding what functional safety was, what certification looked like, how vehicles were built, and how different types of software slot into a vehicle,” Heiser explains. “It also served as a means of engaging and partnering with the supplier community.”

“Where our two companies show a lot of compatibility is that we each understand our relative domains very well. We’re quite aligned from a business perspective, and the ability to test our software in concert with BlackBerry QNX and showcase our work together is great for us.”

Chris Heiser,
Renovo Co-Founder and CEO

Once the Coupe was released in 2015, Renovo went on to work with Stanford University, creating a fully autonomous development platform for researchers. This partnership culminated in the release of MARTY; a self-driving DeLorean capable of precise drifting. It also solidified Renovo’s commitment to its next major project – the release of their automotive data management platform.

“The embedded systems that live inside modern vehicles generate data with enormous potential value,” continues Heiser. “They have some of the best sensors on the planet; highly-calibrated and running 24/7. The ability to quickly access and analyze the data they create is instrumental in building better systems and improving features like collision avoidance, automatic parking, and driver monitoring.”

The Renovo Platform exists to enable that level of access. Designed to process unstructured data at the edge, it also identifies that data’s key insights, storing searchable datasets in the cloud. This allows development teams to quickly leverage the information they need to make faster, more informed decisions.

“Holistic vehicle development gives OEMs a brand-new way to engage with their customers, creating a product that evolves over time and continuously improves,” explains Heiser. “That’s what we’ve come to expect from our technology – vehicles need to step up to that, and Renovo represents an important layer in the stack that helps deliver that functionality.”



Creating a Pipeline to Better Data Management

Typically, it can take days or even weeks to gain access to advanced automotive data. This represents a significant bottleneck in the ADAS development process, and one which creates no small degree of frustration for developers. Through the Renovo Platform, this data can be made available in minutes.

Information from a vehicle's numerous systems – sensors, digital cockpits, LIDAR, and so on – is first fed into the Renovo Platform, which indexes the data and identifies notable objects, scenarios, and conditions. Through machine learning, it then builds correlations across the various datasets. Correlations and events can be searched for a single vehicle, a specific group of vehicles, or across an entire fleet.

It isn't just software developers that benefit from this functionality. A software-defined car represents a complex, interconnected software environment. By treating it as a consolidated data network rather than a collection of independent silos, everyone within an automotive company stands to benefit.

This could include engineers working on a vehicle's body or engine, designers looking to improve the vehicle from a consumer perspective, or safety professionals testing the accuracy and reliability of a sensor.

"We see a very interesting marketplace for automotive data," says Heiser. "It enables a sort of 360° approach to development, providing insights and improvements which might otherwise have been overlooked. Beyond that, it can orchestrate to a wide range of other stakeholders, including car companies, fleets, dealerships, and really anyone who's responsible for the operation and maintenance of vehicles in the field."

The development of its platform was not something Renovo achieved on its own. The company sees itself as a data orchestration and edge computing organization first and foremost. From that perspective, its role is to build software infrastructure to facilitate better data management.

For everything beyond that, it has cultivated a strong partner ecosystem, one in which BlackBerry is proud to play a role.



A leader in mission-critical embedded systems, BlackBerry QNX offers a broad range of safety-certified, secure foundational software products.

With an extensive portfolio of operating systems, middleware, development tools, and engineering services, BlackBerry QNX helps customers develop and deliver complex, connected next-generation systems with greater efficiency than ever before. The QNX® Neutrino® Real- Time Operating System (RTOS) and supporting technologies are used in more than 150 million vehicles on the road today and is leveraged by the top ten automakers.

“Partnerships are incredibly important to us,” says Heiser. “We know what we want to build ourselves, and where we can rely on other partners and systems like BlackBerry QNX.”

The QNX Neutrino RTOS is certified to ISO 26262 – ASIL D and IEC 61508 SIL 3. Issued by TÜV Rheinland, an international leader in the sustained development of safety and quality, these are some of the highest certifications possible for software solutions. This makes the QNX Neutrino RTOS suited not just for use in automotive, but also medical technology, high-speed transit, and more.

In Renovo’s case, it has leveraged the products from BlackBerry QNX’s safety certified product portfolio to provide it with a means for the Renovo Platform to connect to a car’s safety-critical systems. This integration allows Renovo to create safe, reliable, safety-certified data connections between in-vehicle systems.

“BlackBerry QNX is a major player in the automotive space and has been instrumental in helping make our vision for automotive data a reality. The Renovo Platform is now being used by many mutual global OEM customers – clients of both BlackBerry and Renovo – to accelerate the development process for automotive software.”

Chris Heiser,
Renovo Co-Founder and CEO

A Secure, Safety-Focused Foundation

The Renovo Platform represents a significant shift in automotive data management. Traditionally, access to the data generated by different vehicle platforms and systems is either completely locked down or severely limited. The Renovo Platform seeks to make all this data openly and readily available to key stakeholders.

That openness, though necessary for innovation, carries with it significant risk.

“When you’re touching safety-critical systems, you have to be extremely cautious,” explains Heiser. “You cannot do anything which might disrupt functionality. It’s a challenge which is further exacerbated by the fundamental differences between AI pipelines and automotive software systems.”

Within a software-defined vehicle, software is often relatively static, though the real-time data it generates is anything but. There are strict requirements on how different systems can interact with one another. Any changes made to a system is unlikely to require a complete reconfiguration, but rather minor tweaks.

The Renovo Platform, on the other hand, is dynamic and ever-changing, in keeping with the nature of the data it must analyze. It looks more like a clustered computer environment one might find in a cloud data center. The complete opposite, in other words, of an automotive software platform.

“There’s this kind of constant coherence which needs to exist between the AI pipeline world and the safety-critical world,” Heiser continues. “And there’s a lot of technology and expertise required to make that work, both in R&D and in production at high volume. We need to participate in safety-critical computing, but we also need to be capable of buffering and extracting data for our AI pipelines as quickly as possible with the lowest cost.”

Because of its microkernel architecture, the QNX Neutrino RTOS is uniquely suited to allow Renovo to pull and analyze data with minimal impact. Each driver, application, protocol stack, and filesystem runs in its own sandboxed, memory-protected space. Safety-critical systems are given priority, and if even one application or driver component fails, the rest continue to operate unhindered.



QNX Neutrino's advanced security was another draw for Renovo. Managed through a central repository, the operating system features several layered security mechanisms including secure boot, integrity measurement, sandboxing, access controls, and rootless execution. These are easily configured and gives Renovo extensive control over how data within Insight is protected, while also allowing for better overall data integrity.

BlackBerry's expertise in working with automotive software also proved invaluable, as did our drive to work closely with our partners. Since Renovo and BlackBerry began working together approximately three years ago, the two organizations have collaborated extensively to push the Renovo Platform towards production. Alongside BlackBerry QNX's industry leadership, this was one of the core reasons Renovo chose to pursue a partnership.

"The fact that the BlackBerry QNX team was willing to fly out here and work with us to get our systems up and running as quickly as possible was huge," says Heiser. "That willingness to collaborate is one of the things we look for when looking at who to partner with. BlackBerry has demonstrated not only expertise, but the ability and appetite to work with early-stage companies and move as quickly as we needed to."

Paving the Road to an Autonomous Future

We are on the verge of a future defined by smart technology and autonomous software. A future where self-driving cars and AI-driven infrastructure is commonplace. Yet before we can reach that future, there are many challenges we must still address.

Automotive data management is among the most significant of those challenges – and it's one that Renovo seeks to help its clients overcome. Through the Renovo Platform, it aims to transform modern vehicles into a rich source of data which can be used to enhance decision-making within software development and beyond. BlackBerry QNX is proud to have played a part in making Renovo's vision a reality, and excited to see where our partnership takes us next.

About BlackBerry

BlackBerry (NYSE: BB; TSX: BB) is a trusted security software and services company that provides enterprises and governments with the technology they need to secure the Internet of Things. Based in Waterloo, Ontario, the company is unwavering in its commitment to safety, cybersecurity and data privacy, and leads in key areas such as artificial intelligence, endpoint security and management, encryption and embedded systems. For more information, visit www.BlackBerry.com and follow [@BlackBerry](https://twitter.com/BlackBerry).