SOLIDIGM™

Delivering Automotive Testing Systems that are Up to the Challenge

How InoNet Used Solidigm Storage to Improve the Duration, Cost, and Accuracy of Test Drive Results

The automotive industry continues to invest heavily in Advanced Driver Assistant Systems (ADAS) and autonomous driving (AD) capabilities to boost overall vehicle safety and efficiency. Before any new advanced features or capabilities can be brought to market to protect drivers and reduce accidents, they must be thoroughly vetted and tested to ensure they do exactly what they're supposed to do. This is where InoNet steps in.

With more than 20 years of experience serving the automotive industry, InoNet knows what it takes to build a system that can test and validate vehicle applications. The more complex the application (e.g., ADAS/AD), the more the testing system will have to do to ensure the thoroughness and accuracy of the results. This takes collecting, storing, and processing massive amounts of data, in near real-time, to give car manufacturers the confidence they understand precisely how a vehicle will respond, in as many scenarios and as many environments as possible.

The Automotive Testing Storage Problem

When designing and building an in-vehicle testing system for ADAS/AD applications, InoNet had trouble implementing storage that could meet all the demands. Most triple-level cell (TLC) storage solutions could not handle the high volume and write speeds required to collect all the data from all the different cameras and sensors on the car for any duration.

When storage capacity is limited, the length and distance of the test drive are also significantly limited, necessitating the frequent return of the vehicle to home base to swap out the storage. This results in data redundancies, due to the vehicle's back and forth along the same route. It also increases the costs of conducting the test and compromises the thoroughness and accuracy of the results, by limiting the length and variety of the test drives.

InoNet
A EUROTECH COMPANY

About: InoNet develops and produces computer systems for the world's most demanding industries and applications.

Problem: InoNet needed to create a system for the automotive industry that was powerful and rugged enough to be deployed in-vehicle to log, store, and analyze the massive amounts of data generated during drive-time testing.

Solution: InoNet Automotive Solutions and Solidigm SSDs delivered an in-vehicle data logging solution that provided unparalleled:

- Reliability
- Performance
- Capacity

Benefits: Car manufacturers can conduct longer test drives and collect more data reflective of real-world drive conditions to reduce costs and generate insights that lead to:

- Functionality improvements
- Greater operational efficiencies
- Break-through innovations

Figure 1. Harsh conditions combined with the need for fast write speeds and high-capacity data storage pose extreme challenges for automotive testing systems.

In addition, many standard storage solutions were too sensitive to a vehicle's vibrations, temperature changes, shock, and humidity to maintain test drive operations – their reliability was spotty during normal driving conditions, never mind those designed to stress the vehicle.

InoNet needed a storage solution that worked reliably in the most challenging of vehicle environments and could provide the performance and capacity required to support longer test drives to deliver more cost effective, comprehensive, and precise results.

Solidigm's quad-level cell (QLC) solid state storage devices (SSDs) provided the solution that InoNet needed.

InoNet with Solidigm: Delivering a Data Logging Solution for the Automotive Industry Like No Other

InoNet used Solidigm's storage to build a high-performance, in-vehicle testing system that can log, store, and analyze test drive and simulation data to validate the functionality of ADAS/AD applications critical for safe vehicle operation.

Figure 2. InoNet chose Solidigm's storage to deliver the next generation in automotive testing, capable of logging, storing, and processing all the data needed to validate ADAS/AD applications.

Solidigm's Storage Provides:

A Small, Rugged Form Factor

As a solid-state storage (SSD) device, there are no moving parts, enabling it to maintain operations during the bumps, vibrations (0.6 G (10- 200Hz) vibration), and shocks (5G/ms shock) of test drives. The extremely small form factor of Solidigm's SSDs, with their compact footprint of only 2" x 5.25", minimizes the real estate, power, and cooling required, enabling the device to perform regardless of swings in temperature (ranging from 0-50 °C) and humidity (5 to 90% relative humidity).

"Solidigm offers a highly reliable SSD. The vehicle is exposed to increased temperature and stronger shocks and vibration during testing so a reliable drive with no moving parts is ideal." say XXX.

Low-Latency, High Write Speeds

Figure 3. InoNet's QuickTray interchangeable devices make it easy to remove and insert SSDs while also being modular enough to fit into any design.

Solidigm's drives may be small, but they are also mighty – InoNet's QuickTray is able to store up to four SSDs, each of which can be quickly removed, swapped, and copied to get the vehicles out on the road and conducting tests faster. They used four Solidigm SSD D5-P5316 Series PCIe 4.0 drives in a RAID 0 configuration to meet the high-performance requirements (continuous write speeds) of the testing system. The InoNet Highspeed Data Logging Package includes a powerful Dual Intel Xeon or AMD EPY CPU and five NVIDIA graphics/tensor cards, making it ideal for computationally intensive AI/GPU and sensor fusion applications in the ADAS area.

High Capacity

The Solidigm QLC drives can store more data, more cost effectively, allowing vehicles to conduct longer, more varied test drives to improve the thoroughness and accuracy of the results. The ability to store 30% more data in the same space as traditional storage solutions makes a positive difference in the data per km that can be collected in a test drive.

"InoNet Quick Tray solutions rely on storage that offers the right capacity at the right speed. The InoNet solution produces write speeds of up to 14 GBps/ 112 Gbps per quick tray with capacities up to 120 TB. This balance of capacity and performance can only be achieved with Solidigm QLC SSDs" say XXX.

Thermal Performance

Another aspect of the solution developed for InoNet is the MAYFLOWER-B17 LiQuid for cooling vehicle HPCs, which significantly enhances server performance by providing highly effective cooling for the CPU and GPUs. In addition, it consistently dissipates a stream of the heat generated to avoid throttling and improve the HPU server performance.

A Future-Proofed Solution

The use of nonvolatile memory express (NVMe) storage technology in a QuickTray makes the design of the testing system highly scalable to meet the needs of autonomous vehicle logging today and in the future as data demands increase.

What's Next

The capacity, performance, and resiliency of the Solidigm drives, combined with their ability to obtain accurate data can be used by InoNet to support critical artificial intelligence (AI) training and evaluation, in addition to ADSA/AD testing. For more information on how Solidigm can provide customized data storage solutions to support your cutting-edge technology requirements, please visit https://www.solidigm.com/products/data-center/d5/p5316.html.