

Academic Research

Making **new discoveries** in AI and quantum computing

DAS Photonics

How DAS Photonics uses a Lenovo ThinkSystem SR650 server with NVIDIA® RTX™ A6000 professional graphics cards to support pioneering research on the value of AI and quantum computing for defense applications.

Lenovo

Powered by



NVIDIA

1

Who is DAS Photonics?

DAS Photonics operates at the cutting edge of science and technology, creating advanced solutions for defense, security, avionics, and space exploration. Founded in 2005 as a spin-off from the Nanophotonic Technology Center at the University of Valencia, the organization researches practical applications of photonics—the generation, detection, and manipulation of light waves.

Carlos Garcia, Chief Science Officer at DAS Photonics, explains: “Compared to electronic chips, photonic chips have many advantages. For example, our solutions offer lower size, weight, and power consumption [SWaP], making them ideal for environments with limited space and resources.”

DAS Photonics works with clients from three continents, including governments and security contractors. Among the organization’s most notable work has been the development of high-throughput satellites and next-generation systems for gathering signal intelligence.

Carlos Garcia adds: “Another key benefit is that photonics offers exceptionally high bandwidth. That means we can monitor radar signals from a much wider electromagnetic spectrum than conventional solutions, helping to improve threat awareness in military scenarios.”



2

The Challenge

As photonic chips capture vast amounts of data, researchers must be able to process and analyze incoming information at speed and scale to uncover valuable insights. To achieve this, organizations typically use artificial intelligence (AI) based on classical computing algorithms. But in recent years, a new model has emerged that harnesses more powerful quantum computing.

In 2021 the CUCO project launched in Spain, a government-backed scheme to explore the value of quantum computing for various commercial use cases. DAS Photonics joined the program to test the speed and efficiency of quantum algorithms for analyzing signal intelligence gained from photonics.

Carlos Garcia explains: “We planned to run complex simulations to compare the performance of classical versus quantum AI algorithms, which would require huge amounts of computational resources. To support the research program, we would need an immensely powerful server; otherwise, the testing process would become hugely time-consuming and yield limited results.”

“In many cases, organizations can only access quantum computing infrastructure by renting cloud resources from one of the tech giants. Since many aspects of quantum computing algorithms can be simulated in classical computers, we decided to build our own environment, with the performance to analyze hundreds of thousands of signals in our simulations. This facilitates the development of new quantum algorithms before testing them on real quantum computers.”

Carlos Garcia

Chief Science Officer, DAS Photonics

Implementing powerful servers equipped with NVIDIA RTX GPUs

After evaluating solutions from several leading infrastructure providers, DAS Photonics decided to work with Lenovo and NVIDIA to support its research into quantum computing algorithms. The organization selected a Lenovo ThinkSystem SR650 server, equipped with three NVIDIA RTX A6000 graphics processing units (GPUs) to maximize performance, reliability, and efficiency.

DAS Photonics collaborated with Lenovo business partner Grupo Sermicro to minimize risk during the deployment. Grupo Sermicro managed the installation of the Lenovo server, provided VMware licenses, and configured Windows development environments. Today, two AI specialists at DAS Photonics use the Lenovo solution to run simulations, and to work on coding new algorithms.

Hardware

Lenovo ThinkSystem SR650
NVIDIA® RTX™ A6000

Software

VMware

Services

Lenovo Warranty Upgrade
Services

Jorge Ibáñez, IT Team Leader at DAS Photonics adds: “Grupo Sermicro offered great support throughout the engagement—from contract agreements to go-live. As well as offering useful training, they ensured the Lenovo server was delivered and up and running very quickly.”



“The combination of Lenovo and NVIDIA was ideal, providing powerful GPUs with next-generation Tensor Cores that are purpose-built to handle the most demanding AI workloads.”

Carlos Garcia

Chief Science Officer, DAS Photonics

3

Results

With Lenovo and NVIDIA solutions, DAS Photonics is making rapid progress in its research into the value of photonics and quantum computing for signal intelligence. The organization has already completed running the simulations of classical computing networks, and is now repeating the testing and analysis process with more advanced simulated quantum AI algorithms.

Carlos Garcia comments: “During testing, we run our classical and simulated quantum algorithms many times to check and verify their responses, with lots of finetuning. The Lenovo ThinkSystem SR650 with NVIDIA GPUs gives us the exceptional performance we need to run complex, multidimensional AI simulations at very high speed, which will help generate results sooner for the research program.”



Supports cutting-edge research into complex AI and quantum computing fields



10x higher performance than standard desktop accelerates simulation processes



Ensures excellent user experiences thanks to high availability and reliability

Jorge Ibáñez adds: “Compared to a standard desktop, the Lenovo and NVIDIA solution runs at least 10x faster, and computational tasks that would take hours are completed in a few minutes. The reliability, availability, manageability, and ease of use of the Lenovo ThinkSystem SR650 server are also excellent. Everyone is pleased with the results—from our IT team to researchers running the algorithmic simulations.”

Once the CUCO project concludes, DAS Photonics sees many other uses for the Lenovo server. For example, the organization is planning to run highly demanding full-wave simulation software for use in electromagnetic engineering and the development of new photonics applications.



“Expanding our use of AI and quantum computing will help us sharpen our competitive advantage in the years ahead. The Lenovo platform will enable us to move into many other areas, allowing us to strengthen our status as a leader in scientific research and development.”

Carlos Garcia

Chief Science Officer, DAS Photonics

Why **Lenovo**?

One initial point in favor of Lenovo was an endorsement from a member of the DAS Photonics IT team, who had used Lenovo solutions in the past and enjoyed an excellent experience. The key to the selection, though, was the amount of NVIDIA RTX GPUs available within the organization's budget.

Jorge Ibáñez explains: "Other vendors only offered a single graphics card for our budget, while insisting their solutions would deliver the performance that we needed. Lenovo, on the other hand, would provide three NVIDIA RTX GPUs for the same money. We knew that this would make a huge difference and reduce the time needed to run our complex simulations. Lenovo was by far the optimal solution."





“

“We are taking a problem that was previously almost unthinkable in terms of computational times, and making it possible. With Lenovo and NVIDIA, we are able to push new boundaries and make new discoveries in quantum computing and AI.”

Carlos Garcia

Chief Science Officer, DAS Photonics

Partner perspective: Grupo Sermicro

“We are very pleased to contribute to this exciting research project. Providing massive performance on a tight budget was a challenge, but we delivered with Lenovo, NVIDIA, and VMware solutions.”

Andrés Valle

Director of the Eastern Zone, Grupo Sermicro



How can you generate valuable research results sooner?

Developing cutting-edge solutions for defense and space exploration with Lenovo and NVIDIA technology.

Explore Lenovo Servers with NVIDIA GPUs

Powered by

