

Neural Spacetime Lab in Mannheim.

The next dimension
of data acquisition for
AI research.



A²IR

Hochschule Mannheim

The Institute for Applied Artificial Intelligence and Robotics (A²IR) at Mannheim University of Applied Sciences had the crucial task of setting up the Neural Spacetime Lab.

This laboratory is an interdisciplinary research platform that combines the fields of computer vision, robotics, artificial intelligence, and human interaction. It enables the precise capture and analysis of human movements in real time, which is crucial for applications in medical research and robotics.

The mission: To install advanced artificial intelligence to utilize the latest technology in smart cameras that are perfectly matched.

The laboratory encountered several challenges here:

Synchronized recording of human interactions:

- High-resolution and real-time capture from all spatial directions.

Efficient data acquisition and processing:

- Detecting, analyzing and predicting complex patterns of human interactions.

Technological requirements: Intelligent industrial

- cameras, high-performance data-recording servers and advanced AI algorithms.

What posed an even bigger challenge, though, was finding a way to extend spatial data sets to include the dimension of time.

Shaping the future together.



Bundesministerium
für Bildung
und Forschung

DELTA Computer Products GmbH

DELTA, which is headquartered in Reinbek, is a leading company in the AI and technology industry and has been synonymous for innovative high-performance computing solutions for more than 35 years.

Location: Reinbek near Hamburg

Industry: Specialist for AI high-performance computing (HPC) and customized storage, as well as cluster solutions

Team: Experienced AI HPC and cluster experts are happy to advise you

Certifications: NVIDIA Elite Partner

Website: www.delta.de

Email: info@delta.de



A²IR

Hochschule Mannheim

Mannheim University of Applied Sciences - Institute for Applied Artificial Intelligence and Robotics (A²IR)

The Neural Spacetime Lab at Mannheim University of Applied Sciences is part of the Institute for Applied Artificial Intelligence and Robotics (A²IR) and a leading research institute for innovative AI assistance systems in the fields of medicine, logistics and sustainable technologies.

Location: Mannheim

Category: Research institution

Funding body: State of Baden-Württemberg

Research focus:

Research into AI assistance systems in medicine and industry

Team: AI researchers and medical technicians / physicians

Website: www.a2ir.de

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Hyperdrive solution from Reinbek near Hamburg

Delta, with its many years of expertise and wide range of NVIDIA AI solutions, was able to make a decisive contribution. High-quality and comprehensive data is essential for reliable AI models. Poor or incomplete data can severely affect the performance of AI models, leading to inaccurate or unreliable results. Data must be carefully prepared and labeled, which often requires a lot of time and expertise.

With a product range from simple GPU servers to highly complex NVIDIA DGX SuperPOD™ cluster architectures, Delta offered a customized solution for the Neural Spacetime Lab's requirements.

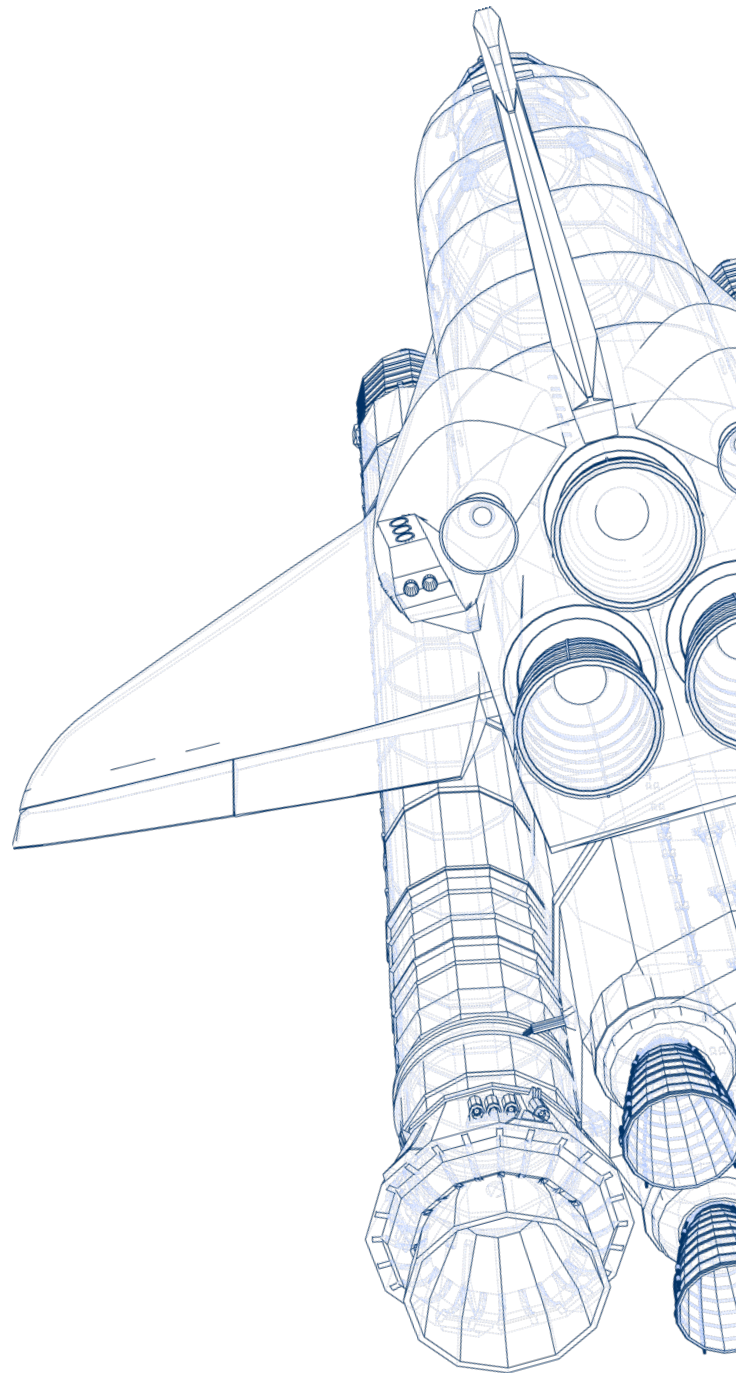
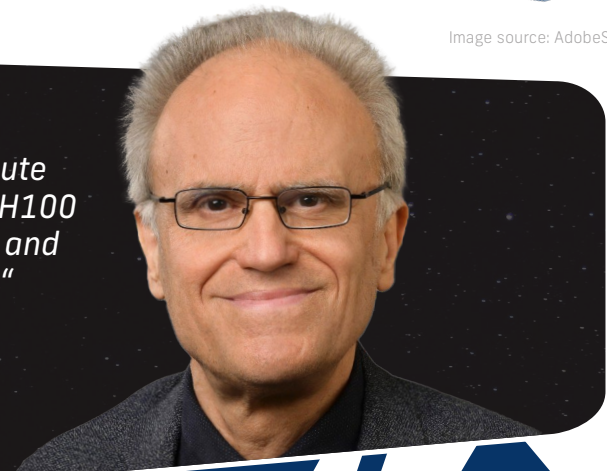


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„We are delighted that we were able to contribute to the success of the project with the NVIDIA H100 HGX server from Kaytus. The scientific result and the high motivation of the team is impressive.“

Hans-Peter Hellmann

CEO at Delta Computer Products GmbH



Access to the latest technology in AI heaven.

As an Elite Partner of NVIDIA, Delta was able to draw on the resources of the world's leading manufacturer in the field of AI, which proved to be extremely beneficial. The state-of-the-art technology of the H100 servers was optimally utilized to maximize the computing capacity of the Neural Spacetime Lab. The servers were set up and tested at Delta and then handed over to Mannheim University of Applied Sciences ready for operation. There they were connected to high-performance data recording servers to ensure seamless integration into the existing infrastructure.

The partnership with Delta has provided the Institute for Applied Artificial Intelligence and Robotics with a significant expansion of its research capabilities. The state-of-the-art GPU servers enable the generation of large data sets and the training of complex AI models, leading to groundbreaking developments in interventional medicine and industry.



„Delta was actually able to provide the H100 server technologies that were difficult to obtain and also offered the most economically attractive solution.“

Prof. Dr. Marcus Vetter
Head of the A²IR-Institute

The result:

“Peter” – the heart of the A2IR

Peter, the supercomputer at the Neural Spacetime Lab, is an impressive technological achievement. It is based on the NVIDIA HGX™ AI supercomputing platform from Kaytus and offers an AI performance of 32 petaFLOPS FP8.

Peter is equipped with 8 GPUs from the NVIDIA H100 SXM series, each with 80GB of GPU memory. This allows him to efficiently accelerate complex AI tasks. The integrated NVIDIA NVLink switch allows the entire 640GB of GPU memory to be used for large AI models and simulations.

In addition, Peter has 2 AMD EPYC CPUs with 96 cores each and 1.5 TB DDR5 RAM as well as an internal NVMe SSD storage of 15 TB for fast access to local data. By comparison, an average laptop has 16 GB of RAM and around 500 GB of SSD storage.

Thanks to the pre-installed Ubuntu Linux operating system, Peter can use the fully optimized NVIDIA AI and HPC software stack from the NVIDIA NGC catalog. These features make Peter a powerful tool for sophisticated AI research and development in the Neural Spacetime Lab.

DELTA / Kaytus* KR 6288 - „Peter“

GPUs:	8x NVIDIA H100 SXM Tensor Core GPUs
GPU Memory:	(640 GB total (80 GB pro GPU))
CUDA® Cores (FP32):	135.168
CUDA® Cores (FP64):	67.584
Tensor Cores (TF32):	4.224
Performance:	32 petaFLOPS FP8
Interconnect GPUs:	NVLink Switch 900GB/s
CPU:	Dual AMD 9654 CPU, 96 Cores, 192 Threads, 192 Cores total, 2.4 GHz (Base) 3.7 GHz (Max Boost)
System Memory:	1.5 TB DDR5
Network:	2x 10G Ethernet (Dual Port)
Internal Storage:	15,3 TB (2x 7,68TB) U.3 NVME drives
Power Supplies/Usage:	4+4 redundant / 10,2 kW
Software:	Ubuntu Linux OS. with NVIDIA DL Frameworks

Additional PCI and disk slots are available for upgrades.
This configuration is optimized for the presented application.

* Kaytus - formerly known as Inspur.

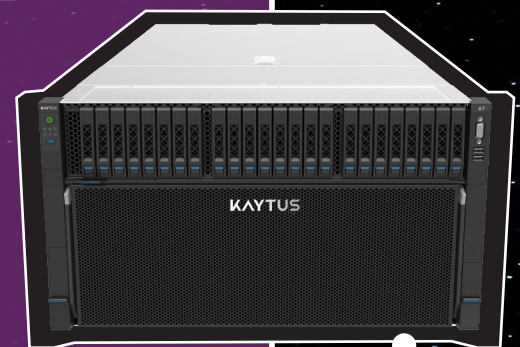


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A new era begins.

New AI assistance systems on the horizon

Deep learning is based on artificial neural networks and the processing of large amounts of data. It enables AI assistance systems to support people in their decisions and actions. This technology allows researchers to develop machine learning and AI models that can understand and react to human interactions.

In the Neural Spacetime Lab, A²IR scientists simulate complex surgical situations. They use a network of 56 high-quality industrial cameras with GlobalShutter technology to capture these situations from different perspectives. With the help of powerful GPUs and NeRF technology, the researchers can capture any desired time and position in space – even for positions that were not captured by any camera. This innovative approach is particularly useful for training AI models in the field of computer vision, but requires enormous computing power.

„The quality of AI assistance systems is decisively dependent up on the amount of data, which has to be as realistic as possible. With the Neural Space Time Lab, we now have the opportunity to generate real data with high temporal resolution and high spatial resolution, which we can then use to train the models for AI assistance systems.“

Prof. Dr. Marcus Vetter



The future of medicine: Deep learning and big-data

By using artificial intelligence and big data analysis, we can support medical professionals during medical interventions in their daily work. These developments are revolutionizing the way medical professionals make decisions by incorporating case-specific, statistical information into their evidence-based procedures.

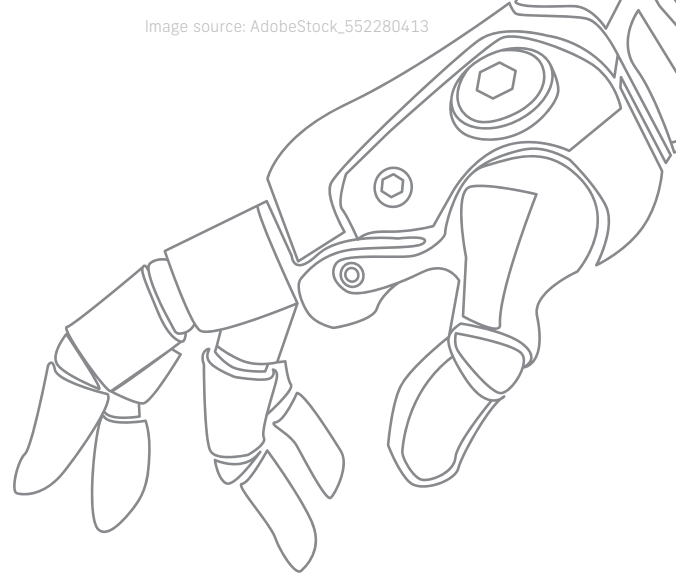


In the coming years, AI assistance systems could offer recommendations on alternative courses of action during surgical procedures. These AI-supported systems can analyze data in real time and provide surgeons with valuable information on how to optimize the course of treatment. In addition, the precise recognition and interpretation of images, texts and patterns enables forward-looking diagnosis and treatment planning.

By analyzing big data, the technology can detect deviations and identify early warning signs of potential complications during medical procedures. In addition, complex calculations can be used to determine the exact position of people, relevant objects or even organs. AI can use all of this information to create a holistic picture, which can be presented to medical professionals in an appropriate manner.

Industry 4.0:

Industrial robots of the next generation



A²IR's Neural Spacetime Lab data is also important for autonomous robotics. In the future, autonomous transport systems in industry could recognize and react to human behavior. These new generations of robots offer more flexibility and are more reliable.

In contrast to conventional systems, which are limited by infrared sensors and have problems with unexpected obstacles, these advanced robots can act largely autonomously. They recognize and avoid obstacles on their own.

This allows them to react quickly and adaptably to changes in their environment. These advantages are particularly important in dynamic environments such as logistics. The A²IR Institute is currently researching these applications.

These robots are not just simple tools, but intelligent partners in the automation of industry. Their reliability and adaptability save time and costs.



Venturing into the future. Synergies with vision

This advanced server technology offers both researchers and students access to state-of-the-art technologies to optimize their education. Students at Mannheim University of Applied Sciences can train their own AI models on high-performance servers in the new "AI Engineering" course.

The successful cooperation between Delta and A²IR impressively demonstrates how technology companies and research institutions can work together to use artificial intelligence responsibly. Delta's advanced

technology and expertise have enabled the lab to make significant contributions to AI research that are applied in industry, medicine and logistics, in addition to benefiting students.

An open approach to AI technologies and the opportunity to try out their own ideas are essential components of the A²IR Institute's philosophy when it comes to educating the next generation of AI engineers.

"It's simply fun to work with it now, and we have to figure out how we can share access to the server, because everyone wants to access it at the same time."

Yannick Bukschat, PhD student



Go to the website here!

Want to find out more? Contact us for more information:

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 **DELTA**
COMPUTER

Coming soon!

New star in sight

NVIDIA B200 Tensor Core GPU



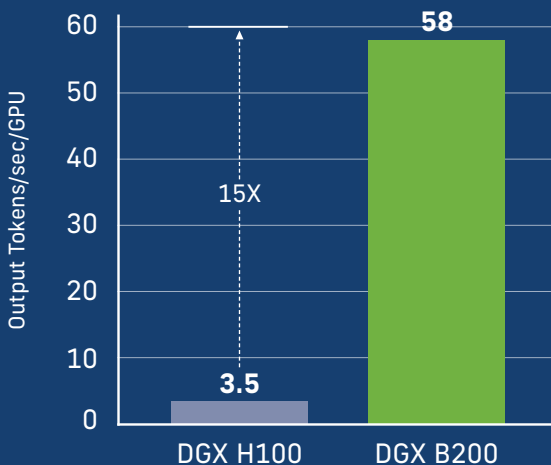
Accelerating Research in the era of AI. Delta solutions powered by NVIDIA.

The NVIDIA B200 propels the data center into a new era of accelerated computing and generative AI. Based on the Blackwell architecture, the NVIDIA B200 Tensor Core GPU delivers a quantum leap in improving inference workloads, enabling real-time performance for resource-intensive language models with trillions of parameters.

Performance redefined!

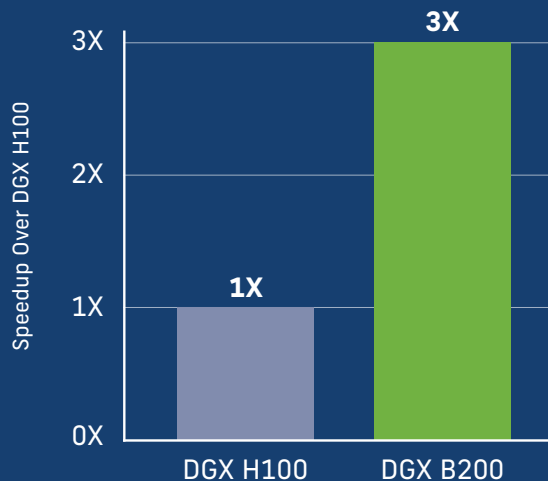
<https://www.deltacomputer.com/nvidia-dgx-b200>

Real-time inference for large language models



GPT-MoE-1.8T Real-time Throughput

New standards in AI training performance



GPT-MoE-1.8T Model Training Speed-Up