SUCCESS STORY | SIEMENS HEALTHINEERS

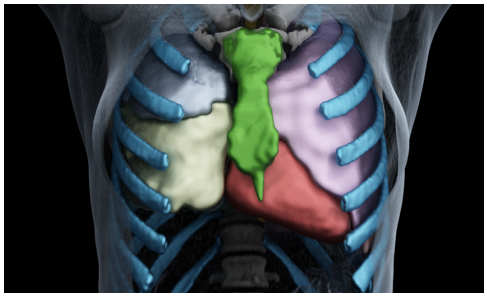
# STREAMLINING CANCER RADIATION THERAPY WITH AI


*syngo*.via RT Image Suite. Image courtesy of Siemens Healthineers

NVIDIA

# Siemens Healthineers accelerates radiation oncology machine learning with NVIDIA HGX Servers

## MEETING THE GROWING DEMAND FOR ONCOLOGY CARE



Organs at risk contoured using *syngo*.via RT

Cancer incidence rates are on the rise, estimated by the National Institutes of Health to increase by 63% over the next two decades. To meet the growing demand for patient care, medical technology leaders are turning to AI tools that can help radiation oncologists provide high-quality, individualized treatment faster.

Siemens Healthineers is using an NVIDIA® GPU-based supercomputing infrastructure to develop AI software for generating organ segmentations that enable precision radiation oncology therapy.

Siemens Healthineers' Sherlock AI supercomputer is powered by a cluster of NVIDIA HGX-1 and HGX-2 servers loaded with NVIDIA Tesla® V100 Tensor Core GPUs. The system provides 24 PetaFlops of processing performance and 3 PetaBytes of NVMe storage, connected over a high-speed 100 Gbps Mellanox InfiniBand network, and is used to run over 600 deep learning experiments daily.

The high-performance low latency switching environment and NVMe storage help keep the GPU servers at high utilization to enable faster model training.

### CUSTOMER PROFILE

| **Organization** | **Industry** | **Location** | **AI Patent Families Owned** | **AI-Powered Product Offerings** | **Website** |
|---|---|---|---|---|---|
| Siemens Healthineers AG | Healthcare | (Europe) Munich, Germany<br>(US) Princeton, New Jersey | 600+ | 45+ | siemens-healthineers.com |

Organs at risk contoured using *syngo*.via RT

**PRODUCTS**

NVIDIA HGX-1 with NVIDIA Tesla GPUs and NVLink™

NVIDIA HGX-2 with NVIDIA Tesla GPUs and NVLink

Mellanox EDR Infiniband Switch

# AUGMENTING RADIATION THERAPY WORKFLOWS

Radiation therapy for cancer patients is a complex workflow that includes modeling the patient, contouring the target and organs at risk, and simulating, planning and delivering treatment.

One of the most time-consuming tasks in this process is contouring (segmenting) the healthy organs surrounding a patient's tumor that need to be spared from excessive radiation dosing.

Traditionally, radiation oncologists contour the tumor target volume and organs at risk, deciding how much radiation should be used to treat the tumor target without damaging neighboring normal tissue.

To help oncologists develop radiation treatment plans faster, Siemens Healthineers uses *syngo*.via RT Image Suite, a software tool that automatically outlines organs using AI-assisted AutoContouring. Trained on over 4.5 million images using the Sherlock supercomputer, the AI tool automatically outlines 47 organs, saving radiation-oncologists time and easing organs-at-risk contouring tasks.

"AI-assisted AutoContouring helps save time and improve standardization in organs-at-risk contouring," said Dr. Fernando Vega, Head of Software and Concept Definition for Radiation Oncology at Siemens Healthineers. "This allows radiation-oncologists to better focus on other crucial aspects of patient care."

"AI is starting a new era in software development, where advanced neural network architectures, large collections of curated data, and massive computational power come together to deliver tremendous performance and high clinical value."

**Dr. Dorin Comaniciu,**
Senior Vice President of Artificial Intelligence and Digital Innovation at Siemens Healthineers.

## TAPPING INTO SOFTWARE TO WRITE SOFTWARE

Behind this explosion of AI in medical imaging is a new dynamic within the software development paradigm: the advent of software that writes other software.

Traditionally, engineers have written applications from start to finish, a time-consuming process that requires niche computing expertise. Now, with access to powerful compute resources, AI algorithms can leverage training data to learn processes like medical image analysis without every element being explicitly coded by a developer.

Siemens Healthineers, which has been involved in machine learning since the 1990s, is harnessing this AI capability with its Sherlock system. The supercomputer learns from the company's massive data lake of over 900 million curated images as well as radiology reports and clinical and genomic data. So far, Sherlock has led to the development of more than 45 AI-powered applications approved for clinical use.

"Supercomputing infrastructure is essential to our research scientists—in order to complete deep learning training experiments within hours rather than weeks and reducing the time it takes to iterate until the best accuracy is achieved," said Gianluca Paladini, Sr. Director of Engineering at Siemens Healthineers responsible for the Sherlock architecture. "We continuously upgrade Sherlock's processing power, as it enables us to manage AI R&D projects at an industrial scale."

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