

CASE STUDY



Medical University of Graz

A new dimension in anatomy teaching
with 3D and LED technology

With its “VirtualAnatomy” lecture series, the Medical University of Graz and the Johannes Kepler University Linz are pioneers of digital teaching in anatomy. Now a unique combination of 3D and LED technology in one installation marks another milestone in the project, setting new industry standards. The visualisation solution at the Medical University of Graz uses dvLED technology from Sharp/NEC.

Working with anatomical specimens in the lecture hall has always been an indispensable part of medical training. However, access to physical specimen material as well as visualisation options in the lecture hall are often limited. Digitization initiatives can close this gap, as demonstrated by the Johannes Kepler University Linz (JKU) in cooperation with the Medical University of Graz (Med Uni Graz), which jointly offer a bachelor's degree in medicine.

The challenge

Limited visualisation options in the lecture hall

Since JKU does not offer traditional anatomy teaching using donated bodies, Univ.-Prof. Dr. Franz Fellner, Head of the Department of Virtual Morphology at JKU, initiated the “Virtual Anatomy” program. MRI and CT data from real patients are used to create photorealistic three-dimensional images of the human anatomy. Using 3D glasses, students can view organs as a whole and zoom right into their smallest structures – on a stereoscopic display measuring seven by four meters with a resolution of 4K and a 120Hz refresh rate.

JKU’s partners in this unique research collaboration are the Ars Electronica Futurelab, with its “Cinematic Anatomy x Deep Space” program, and the software experts at Siemens Healthineers. Some virtual anatomy lectures have been transmitted from JKU to Med Uni Graz as 2D video streams, and in return, teaching content using anatomical specimens has been transmitted to Linz via 2D video stream.

Those responsible at Med Uni Graz, including Dipl.-Ing. Dr. techn. Herwig Rehatschek, head of executive department teaching with media and designated project manager for implementation in Graz, wanted to bring content to life in 3D and real time in Graz, too, and make lectures more interactive. In addition to components such as 3D glasses for lecture participants and a suitable 3D camera for transmission, the display solution chosen for the lecture hall was crucial – the combination of 3D and large-scale visualisation with high-quality, razor-sharp images and excellent contrast poses a particular technical challenge.



The solution

Unique combination of 3D and LED technology

Following initial discussions that began in early 2023 and a successful 3D LED demo in June of the same year at the Sharp/ NEC LED Solutions Center (LSC) with the media technology planner and representatives from Med Uni Graz, JKU and the Ars Electronica Center Linz, those responsible opted for visualisation technology from Sharp/NEC. „Our expertise in combining LED and 3D displays was particularly convincing,“ says Oliver Bauer, Regional Sales Manager at Sharp NEC Display Solutions Europe. Other project participants from Med Uni Graz were Christian Zagler from Outstanding-Media GmbH as technical planner, and PKE Electronics GmbH as integrator, who won the contract.



Med Uni Graz - Chair of Macroscopic and Clinical Anatomy / Sarah Lücke

Following the planning phase, the installation of a 7.3 x 4 m LED wall with a 1.9 mm pixel pitch, native UHD resolution, full 3D support and low-power technology was finally completed on site as a turnkey solution by the Sharp/NEC LED Solutions Center in July 2024. Thanks to flip-chip SMD technology, the dvLED modules used require around 60 percent less power than conventional indoor LED installations. Their heat development is also minimized, which in turn reduces the need for additional air conditioning and contributes to the durability of the display.

The video wall delivers an excellent contrast ratio of up to 8000:1 and a deep black level. With a luminosity of up to 700 candela per square meter, the content is shown to its best advantage even in the most varied lighting conditions, and optimally presented to lecture participants.



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The result

Smooth integration and new standards in digital anatomy teaching

The Sharp/NEC LED wall fits seamlessly into the existing solution and works in conjunction with the other components such as stereoscopic 3D 4K cameras and 3D glasses.

“A complete success, which speaks volumes for the fantastic cooperation between all those involved in the project. As a manufacturer, we are particularly pleased to have been involved in the project from the very beginning. We are setting completely new standards with the installation and combination of LED and 3D, ”

summarizes Oliver Bauer.

After some of Univ.-Prof. Dr. Franz Fellner’s virtual anatomy lectures were transmitted to Med Uni Graz using only 2D video stream, a technical quantum leap is now afoot: The 3D lectures from the JKU medSPACE in Linz are now shown live on the LED wall at the Medical University of Graz, in stereoscopic 3D with 3D glasses for up to 500 students.

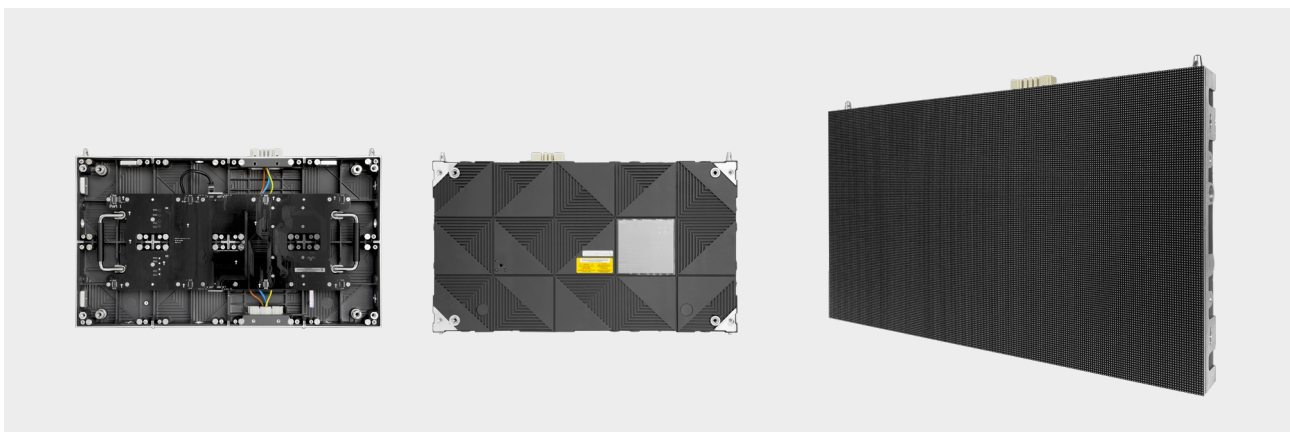
The audio signals and control data for the program from Linz are transmitted to Graz in real time so that students at both locations can participate in the lecture simultaneously. As part of the Medical University of Graz lectures, images of specimens are transmitted live to Linz using a stereoscopic 4K camera to enable students at the JKU medSPACE to experience anatomical specimens in 3D alongside the virtual anatomy. The lecture is interactive, and the lecturers have the option of communicating via a video conferencing audio channel and sharing questions from their students.

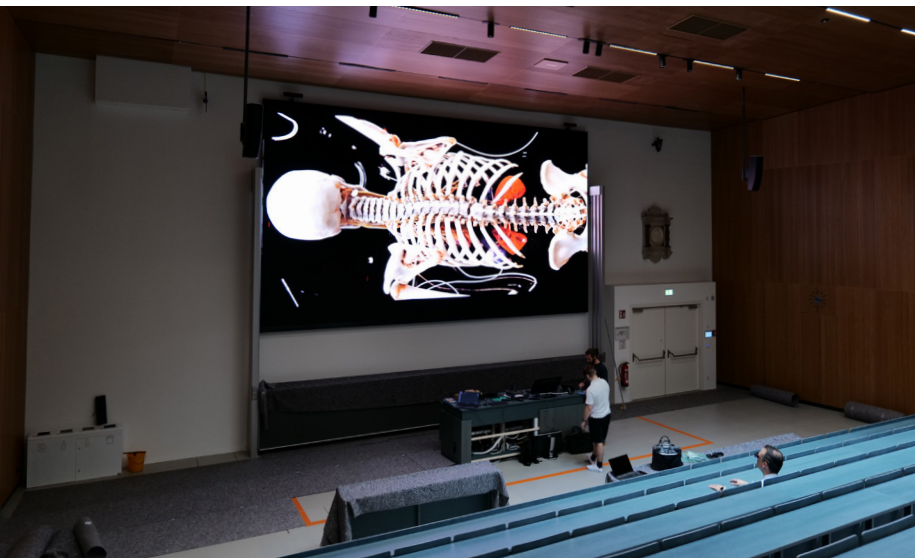


“What belongs together is now coming together. In virtual anatomy, we work with datasets from living human MR and CT images. Traditional anatomy teaching uses specimens and donated bodies. In order to gain a broad understanding of anatomy and pathology, both are hugely important. This takes training to a new level,” explains Univ.-Prof. Dr. Franz Fellner excitedly.

”The collaboration between JKU and Med Uni Graz really is unique. Together we have achieved great things and, through the combined application of the latest and proven technologies in anatomy and radiology, we have created a solid basis from which to prepare our students for the medicine of the future,”

says Univ. Prof. Dr. Niels Hammer, Chair of Macroscopic and Clinical Anatomy at the Medical University of Graz. “From a technological point of view, the networked 3D teaching, synchronized at two university locations, as well as the 3D display on an LED wall for 500 students, is high-tech pioneering work and enables us to train students using the most advanced methods possible,” says Dipl.-Ing. Dr. techn. Herwig Rehatschek (project manager at Med Uni Graz).





”We took an innovative approach to the joint pre-clinical training for our students from the outset. The fact that virtual and traditional anatomy are now taught in a shared virtual 3D lecture hall is a significant added value for the students.”

This is the reaction of the Vice-Rectors for Teaching, Univ. Prof. Dr. Andreas Janko (JKU) and Ao.Univ.-Prof. Mag. Dr. Dr. Erwin Petek (Med Uni Graz).

Site information

SECTOR

Education, healthcare

CUSTOMER INFORMATION

Medical University of Graz
medunigraz.at

INSTALLATION PARTNER

PKE Electronics GmbH | www.pke.at

MEDIA TECHNOLOGY PLANNER

Outstanding-Media GmbH

INSTALLATION DATE

July 2024

EQUIPMENT

- NEC LED-FE019i3 (144 Cabinets)
- NEC LED-RPS-CL-R



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