mini VR-Wall

schneider digital

Professional 3D-Hardware

3D-Powerwall creates a realistic viewing experience for Science, Architecture and Engineering.

Schneider Digital mini VR-Wall at the 3D-Visualization Center of the Georg-Simon-Ohm-University of applied Sciences in Nuremberg, Germany

High-End 3D-Powerwall visualises plants and machinery in realistic life size at the Visualization Center of the Georg-Simon-Ohm University of applied Sciences.

Mini VR-Wall, Shutter glasses and Joystick: Immerse into a virtual world of professional, stereoscopic projection.

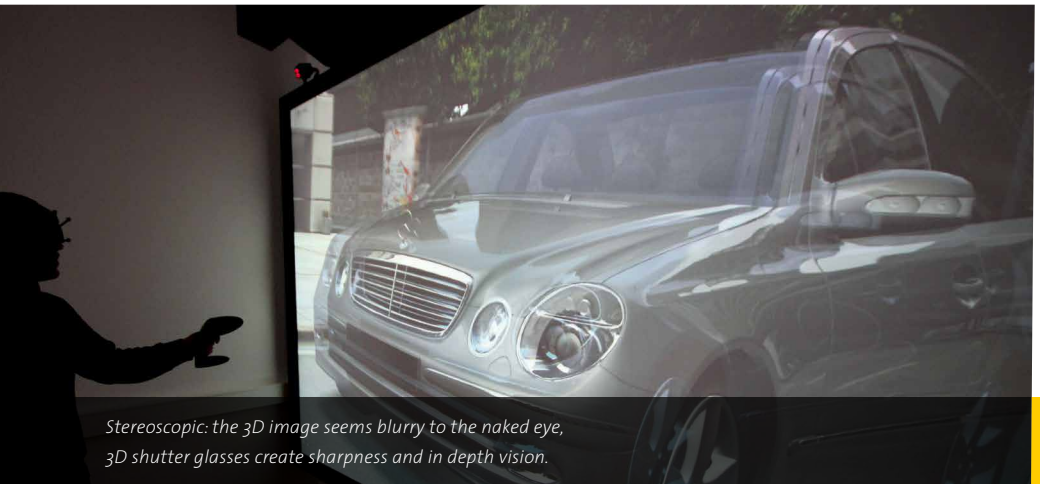
Virtual Reality creates a realistic spatial experience

„Please come and join me - let me show you our latest project!“ Mario Lugic´, scientific assistant at the 3D-Visualisation center of the Georg Simon Ohm University of Applied Sciences in Nuremberg, Germany, guides his visitors to the conference room of the center. There are 12 chairs in the room, carefully positioned, giving a perfect view of a large projection screen covering the back of the wall. With a dimension of 3, 53 x 2, 20 meters, the scenario resembles a movie theater. “What really impressed us the most was the very small depth of the wall, only about 60 cm! Other walls need two to three meters of space. The room would not be as spacious as it is now.” An assistant is entering data into a computer, sitting at a small desk on the right side of the room. Next to him stands a black rack with four computers on it. „Multiple Faculties cooperate at our center. Architectural, Design, Electrical Engineering, Precision Engineering, Information Technology, Mechanical Engineering and Supply Technology. It is our job to create three-dimensional visualizations for different faculties as well as external companies. Have a look, I will demonstrate it to you!"

„The walls manageable size - 60 cm, which is almost next to nothing - was the key argument for us!"

Greater reality with 3D

Driton Morina, also a scientific assistant at the 3D-Visualisation Center, points to a pair of glasses lying on the conference table. They are not an ordinary pair of glasses – there are antenna-like rods on each side with small, silver colored spheres attached. These glasses are necessary to be able to view 3D images on the projection screen. The blurred 2D image instantly turns into an amazingly sharp three-dimensional projection: a car model can be seen, standing on a rock plateau at the Monument Valley in Utah, USA. The sun is shining on a perfectly deep blue sky, snow patches can be seen on the ground. As soon as the viewer moves in on the projection screen the car seems to come closer, it is all very realistic! The viewer can walk past the car to either its left or right side: the car is always in the right perspective. It all seems so real, the only thing missing is the noise of the gravel under your shoes! „Be careful, you are about to run into the wall!” Morina shouts out. “That happens all the time, once the viewer has immersed into a world of 3D. Everything seems so realistic – it is hard to keep in mind were the projection screen starts and were it actually ends. You can also take a look inside of the car, if you would like.” The visitor is handed a joystick. The joystick resembles a futuristic looking laser gun: with a handle, a trigger and a barrel. As soon as the trigger is pulled the joystick is connected to the virtual car via a bright red beam. “You can detach individual car body parts and view the inside of the car by just keeping the trigger pulled.” It’s kind of tricky in the beginning but after a couple of tries it becomes easier and easier and the virtual car body parts begin piling up next to the car on the rocky underground. The viewer’s eyes wander to the black seats, to the steering wheel and land on the dash board - it all seems so real!



Stereoscopic: the 3D image seems blurry to the naked eye, 3D shutter glasses create sharpness and in depth vision.

Minimal mounting depth

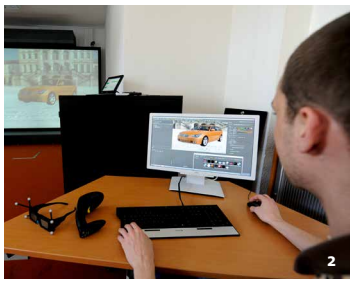
The projection screen called mini VR-Wall was developed and manufactured in joint co-operation by Schneider Digital and 3DInsight. Its projection screen size of around 8 square meters is large enough to offer a realistic spatial sensation to the viewer. It covers the entire surface of the back wall in the conference room at the 3D-Visualization Center, giving the impression of a small movie theater. The four projectors with light engines are integrated into the slim sheet metal strips situated on top and bottom of the VR-Wall.

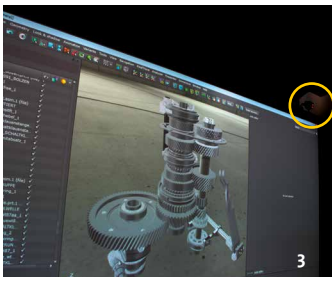
„The walls manageable size - 60 cm, which is almost next to nothing - was the key argument

for us!“, explains Lugic´. This special, low profile light engine construction has another advantage: the user can be right in front of the wall, pointing, moving or getting real close to the screen - without casting even the slightest shadow! The projections appear very realistic due to their extremely high resolution. Images are displayed very sharp even if the user is right in front of the projector. Lines and outlines are razor sharp and without the slightest hint of inaccuracy - thanks to a pixel size of only 1,5 millimeters. Besides, the small pixel size is very easy on the eye allowing continuous working without straining the eye. Two infrared tracking cameras are attached to the projector casings of the mini VR-Wall. They are part of the tracking system developed by the company Advanced Realtime Tracking (ART), from Weilheim, Bavaria, Germany. The cameras perceive the motion of the viewer and process the optical information right away so that the display of the projected object adapts to the viewer's vision in real time: angles, distance and perspective change as soon as the viewer moves and leaves his position. To make sure this happens with the desired precision, the viewer has to wear special eyewear with six antenna-like rods of 8 cm in length, and little, silver balls, the so called 'Markers', at the end. The Markers reflect infrared radiation send out by the camera. The associated computer calculates the position of the viewer with the reflected radiation and projects the model to the wall accordingly – in real-time!

Free choice of software

The visualization center uses DeltaGen 10.0 Software from Realtime Technology for the conversion of CAD data into VR-models. DeltaGen processes CAD- and CAS data into realistic visualizations in very high visual quality. The software is capable of displaying lights, shadows or even reflecting surfaces physically correct thus creating an authentic and true-to-life model. In combination with the tracking system realistic objects come to live on the mini VR-Wall – viewable from all different angels. “That is the great advantage the wall offers compared to standard projection on a computer monitor. “, says Lugic´. „This particularly applies to large objects such as cars, truck engines or buildings. The whole body interacts with the model.“ When planning an assembly line, for example, the Wall can quickly ascertain whether there is enough space to operate machinery ergonomically or if the emergency exit is easily accessible. The Powerwall can be actively supportive for architects and engineers when planning large construction sites. Besides, the mini VR-Wall is offered independently from a special VR-Software – another important aspect for Lugic´. “This way we are not bound to a specific software producer but can choose the best offer! That was one requirement pertaining to the system."



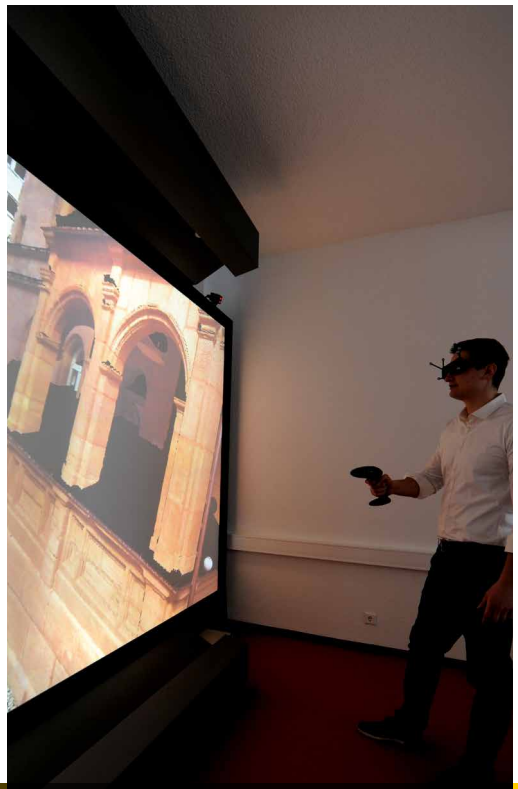


1| Media control: Via tablet PC, the display on the wall is changed to split screenmodus 2| Central remote: A cluster, consisting of four PC's in the black rack, modifying data for projection. 3| High-End Stereoscopy: The wall with DeltaGen 10.0 software. The tracking camera for interaction with the projected model, is visible at the upper right side of the wall.

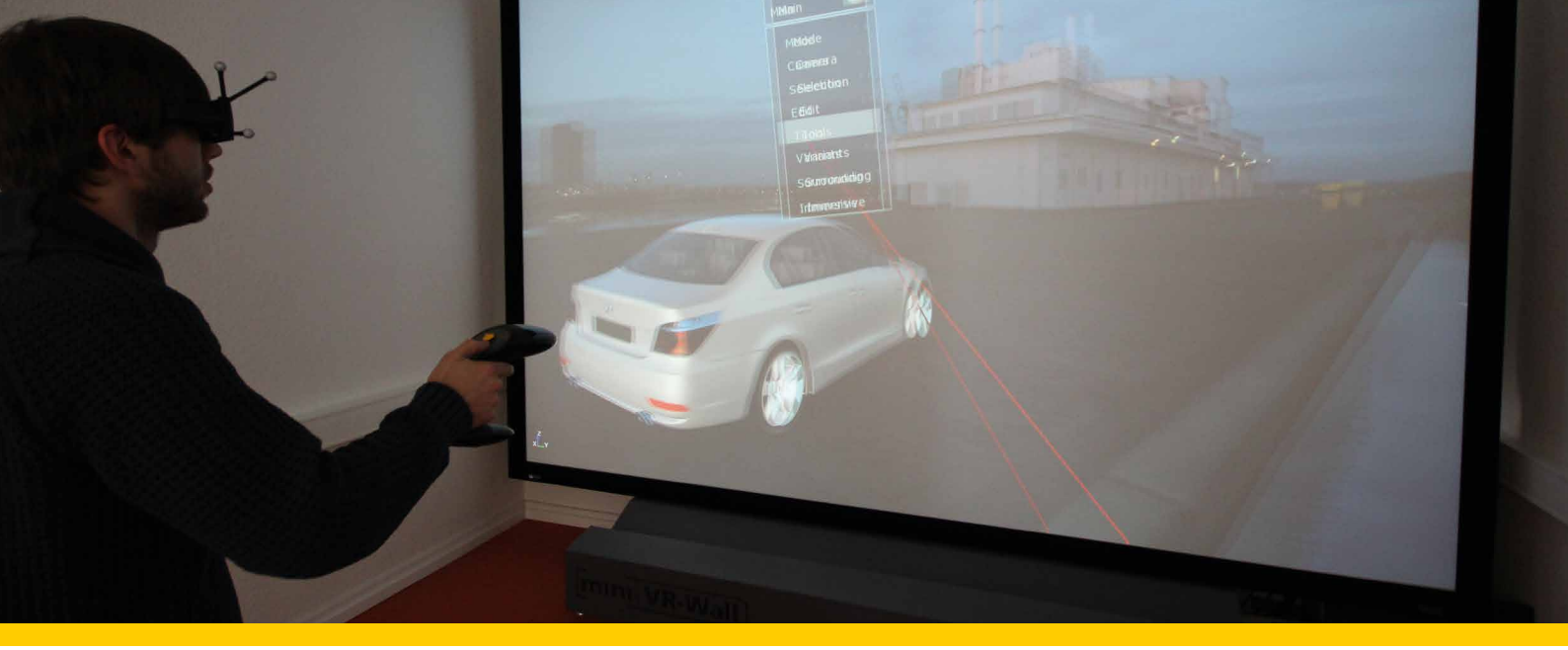
Wide range of opportunity

The research staff of the 3D-visualization center at Ohm-University sees a wide range of possible uses for the mini VR-Wall.:
”Thanks to the immersive visualization, companies are able to delay the production of proto types for a long period of time thus saving a lot of money. The mini VR-Wall practically pays for itself!” But product development is not the only area of application for the mini VR-Wall. Public works, e.g. community centers, a bridge or a cultural center can be realized at a very early development stage. “Different experts obtain a common basis of communication due to the realistic display of objects thus eliminating ambiguity fast and efficient.“, explains Morina. The center is focusing on cooperation with external companies, with the help of the powerwall. “We foresee a great future for VR-technology and are offering the same to small and midsized companies as a modern development platform. I am very optimistic about that.”

“That is the great advantage of the wall, compared to projection on a monitor. “, says Lugic. „This particularly applies to large objects such as cars, truck engines or buildings. The whole body interacts with the model.“



From reality to virtuality: an assistant is creating a 3D scan of the university building, enabling Architects to combine the acquired data with CAD information and thus represent the realistic design.



The 3D-Visualization center at the Ohm-University

Brief profile:
Multiple Faculties cooperate at the 3D-Visualization center: Architecture, Design, Electrical Engineering, Precision Engineering, InformationTechnology,MechanicalEngineering and Supply Technology. The center is developing new methods and tools of 3D-visualisation, functioning as an interdisciplinary interface. This includes virtual design studies, assembly simulation, virtual conducted training-assembly and service instructions or even structural planning. To closely relate science and practice, the center cooperates with extern partners, offering access to modern 3D-technology. This includes, among others, 3D-scanning, 3D-rapid-prototyping, computer generated imaging (CGI) and virtual reality, thus giving companies the opportunity, for instance, to benefit from the center's 3D-technology with very flexible conditions. The close cooperation with scientific institutes offers external partners the chance to conform their research- and development process on the current state of technological and scientific progress.

For more information please visit:
www.ohm-hochschule.de/kompetenzzentren

Mini VR-Wall Product Website:
www.vrwall.com

Overview: Our mini VR-Wall at the 3D-Visualization Center

mini VR-Wall

The **Task:**
To achieve a realistic visualizations of mechanical components, plants, constructions in virtual reality.

Requirements to the VR-Technique:
- Realistic display of virtual models
- Low depth of VR-hardware
- Hardware independency of VR-software
- Stereoscopic 3D-Projection
- Tracking-System enabling images to be seen from various perspectives
- Interaction of the user with the virtual 3D model

Solution:
- Hardware: mini VR-Wall
- Resolution: 2.560 x 1.600 Pixel
- Pixel size 1,5mm
- Color depth: 8 bit RGB
- Display surface in format 16:10 – 3,53m x 2,20m
- Measurement inclusive rim (WxHxD) 3,69m x 2,90m x 0,62m
- Brightness: 4x 2.500 ANSI-Lumen
- Angular field: 85 degree
- Two tracking cameras and special 3D-shutter glasses
- Cluster-solution as PC hardware: 1 Master, 2 Slaves
- Tracking via joystick or tablet-PC

Software:
- Operating system Windows 7 64-Bit
- DeltaGen 10.0 by Realtime Technology AG for visualization in 3D, Germany
- Tracking-System by Advanced Realtime Tracking GmbH, Germany

The result:
- Realistic visualization
- Interaction of the viewer with the model via joystick
- Significant cost saving by avoiding prototypes in an early design state
- Improved cooperation and networking between various experts
- Better design of plant and machinery

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SCHNEIDER DIGITAL
Josef J. Schneider e.K.

Maxlrainer Straße 10
D-83714 Miesbach

Tel.: +49 (8025) 9930-0
Fax: +49 (8025) 9930-29

www.schneider-digital.com
info@schneider-digital.com

Partners: 3Dconnexion EIZO FirePro AMD NVIDIA PLANAR