# *Im/material Theatre Spaces: Virtual and Augmented Reality*

REVIEWED BY **KARL G. RULING**


DTHG, THE DEUTSCH THEATERTECHNISCHE GESELLSCHAFT, has published a report on its three-year research project into the potential and realized uses of augmented and virtual reality in theatre. The report exists digitally on the digital.DTHG website at https://digital.dthg.de/en, but it can be downloaded as a 134-page book as a low-res or high-res PDF. Each double-page spread is 27.9 by 42.0 cm (A3 paper). It fits well on US 11" X 17" paper or squashed on legal-sized paper; you need a wide monitor to comfortably read it on-screen.

*Im/material Theatre Spaces* has three main themes—architecture, stage design, and theatre technology—with chapters or sections reporting on particular projects in each area. It focuses on the practical applications of augmented and virtual reality to make theatre and to train people to work in theatre. It's an assemblage of projects, descriptions of them with participants' evaluations of how well the projects worked, and suggestions of new projects and better outcomes for the future.

I found *Im/material Theatre Spaces* challenging reading—absolutely worth reading—but challenging. This is partially because it's a German document, even if translated into English (connotations don't translate even if the words do), and it's rooted in the cultural context of German theatre performance and practitioner training. Furthermore, there is jargon in both the English and German versions that I couldn't sort out with Google. However, the challenge is worth the work. How can we use AR and VR technology to help us put together shows safely and efficiently, and what aspects of the technology can be used in shows to enhance an audience's experience?

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The sections dealing with technician instruction and training and with design communications struck me as most clearly outlining AR and VR benefits. The chapter "Augmented reality in event technology: interactive 3D models as operating tools for complex constructions and systems," offers a prototype of AR-supported assembly instructions for a Gerriets TRUMPF 95 traveler track. The instructions are in the form of an interactive website that guides the user through the assembly in ten steps. What sets this apart from printed instructions or a YouTube video is that the user can change the view of the animations, e.g., turn the image, zoom in and out. The team working on the prototype used a WebXR interface, which allows the website and assembly instructions to be displayed on a variety of different devices, including flat screens (a computer or tablet) or on augmented reality glasses or the AR function of a smartphone or tablet. AR lets the assembly images be overlaid for the viewer on the real object being assembled.

I question the wisdom of wearing AR glasses on stage during a load-in and would worry about kneeling on my smartphone,

but this 3D interactive assembly manual seems reasonable and useful as long as there is a fast Internet connection. In the "Reality-Check WebXR-Tutorial" chapter one commenter noted that many theatres don't have a stable WLAN (what Americans call "WiFi"). Of course, if you are using a smart phone, cellular data works—where there is fast service. This trial was done at the Deutsche Theater Berlin. Berlin has excellent 4G and 5G service, but that's not the case everywhere; this summer I found 2G more common in the German countryside. Nevertheless, I can see AR-supported instructions being useful in many situations—and, as the text points out, instructions on a website can be easily updated if found wanting or the product changes.

"Virtual teaching and learning spaces" chapters offer examples of where VR is useful in training technicians. It's nice to work in a real space with real equipment, but the text notes that this was impossible during the pandemic, and working in a virtual space allows students to try things quickly without putting themselves and others at risk. The virtual learning space "Hazard Detector—finding errors in virtual space" tests classroom learning in a virtual working environment, for example, a truss grid in a trade show hall. Before the grid is flown, the student has to do a final safety check and identify possible dangers, such as a hammer left on the truss or something more subtle such as a missing sling label. The task can be complicated by the addition of realistic trade show load-in noise: hammering, forklift engines, people shouting. This virtual learning space gives the student the opportunity to actively identify hazards (not watch the smart kid in the class do it), without the danger of actually breaking someone's skull with a hammer.

The virtual learning space "rehearsal stage set up" struck me as not so much a teaching tool as a production tool. Its aim is to reduce the time it takes to set up a rehearsal space by first letting someone do it in virtual space. Rehearsal halls are often fitted with stock stair units, door frames, flats, acting furniture, and platforms as generic units that can be used to mimic the setting where the show will actually be performed. Setting up a hall for rehearsal can be a lot of time shoving things around, trying to make them fit and get the right perspective for the director and other members of the creative team. A scale 3D model of the hall with the available scenic and acting units in virtual space can facilitate planning the hall setup—and when something doesn't quite work ("We just blocked the emergency exit!") the corrections are easier.

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The chapter "Augmented reality as a communication tool: mediation of complex refurbishment and construction projects through XR technologies" offers an interesting story of refurbishing the Luisenburg Felsenbühne, a 132-year-old outdoor performance space, built on a rocky hillside in the middle of a forest, and covering 4,000 sqm. It's a complex space, part natural trees and rocks, and part structures installed by people such as stairs, platforms, scenery walls, and lighting positions. Certainly, over its 132-year history drawings and models have been used to plan productions and renovations, but not everyone can read a floor plan, for example external stakeholders who might need to fund or okay a project. The space had been digitally mapped in 2018, making it possible to create an easy-to-use augmented reality presentation format. Using a tablet, smartphone, or AR glasses, users can present three-dimensional content overlaid on a drawn floor plan or a physical model. The physical-real objects serve as anchor points for the overlay of the digital content. It's a useful communication tool even for sophisticated team members used to drawings, pasteboard models, and 3D CAD.

"Digital twins of theatre technology history: augmented reality as a teaching tool for theatre technology and architecture" and "Bringing theatre heritage to life: virtual reconstruction of theatre architecture as an immersive experience" are about presenting and teaching technical theatre history. The first is part of the Erasmus+ project "CANON." Teachers and students from nine European higher education partners from Belgium, the Czech Republic, Spain, Germany, Italy, Sweden, and the United Kingdom are developing a common and open database of European theatre technology including "a canon of the 100 most important European milestones of technical theatre history." Media content is linked to the database and can be compiled into a presentation with an editor tool and played on a variety of devices. The 3D objects compiled can be visualized using augmented reality, with a hand-cranked wind sound effect machine shown as a good AR prototype. An animated 3D representation with sound, video, and images supplemented with texts and other sources "makes theatre history easily accessible."

The "Virtual reconstruction of theatre architecture as an immersive experience" chapter is about "Opening Night at the

Großes Schauspielhaus – Virtual Reality Time Travel Berlin 1927," an imaginative digital creation of how a person might have experienced that event. I saw an earlier version of this at Stage|Set|Scenery in Berlin in 2019 and reported on it in "A letter from Berlin" in the Summer 2019 issue of *Protocol*. It offers virtual guided tours of the digitally recreated space, taking viewers through the lobby into the gigantic auditorium and backstage. The tour guides are virtual, too, with one being an avatar of Fritzi Massary, a soprano from Vienna, who died in Southern California in 1969. You can experience "Opening Night" with VR goggles on the Steam platform (http://estalink.us/r0915) or watch a conventional video on YouTube (www.youtube.com/watch?v=VCzouCvcMLI).

"Hybrid-real stage spaces: co-creative performances in analogue-digital intermediate spaces" is about projects that will excite some readers and make others wonder "Why?" It explores installations where artists and audience members meet and become both actors and designers of an experience jointly created in real-time. One VR project is "Spatial Encounters," an event with one or more musicians, a visual jockey as "Master of Virtual Scenography," and up to nine goggle-wearing visitors interacting in an open space of about 150 sqm. The photos in *Im/material Theatre Spaces* show people wandering around a large room, with theatrical fog and colored beams of light. What's going on? "Within the concert performance, different spontaneous narrative dramaturgies with about five to six scenes are created through the collaborative interaction of the actors. The design is determined solely by the actors—audience, musicians, and VJ—so each performance is unique and develops its own atmosphere." Obviously, you have to be one of the fewer than a dozen participants to really know what's going on, but Christian Siegmund, a facilitator from the Chamber Music Festival, Volkenroda Monastery, describes it as transformative for those who experience it, making it easier for them to access music and culture.

Of course, there is more in this 134-page publication, its parallel multi-page website, and its "further reading links" than I can stuff into 1,700 words, but you can access it yourself at no cost other than your time at https://digital.dthg.de/. The website and publications are available in English and German. Take your pick! ■

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