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Press

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Siemens and Bavarian State Opera develop digital twin for Bavaria’s National Theater

- **Digital twin simulates realistic acoustics and sound effects**
- **Mixed-reality application enables audio-visual experience of digital event venues**
- **New functions and configurations enhance planning and staging**

Siemens and the Bavarian State Opera are digitalizing the acoustics in Bavaria’s National Theater in Munich, Germany. The result is a digital twin that simulates sound effects, orchestral setups and venue configurations in a realistic 3D acoustic model so that musicians, the director and conductors can assess a concert hall’s acoustics even before the first rehearsal. The Sound of Science, a mixed-reality application, allows users to acoustically test various orchestral setups and audience positions in Bavaria’s National Theater with the help of virtual-reality goggles independently of the users’ physical location.

Siemens launched the Sound of Science at the Salzburg Festival in 2024. In developing the application for Bavaria’s National Theater, the company is now using it to enhance the performance of yet another internationally renowned cultural institution. Released just in time for the Munich Opera Festival, the current version includes additional concert hall configurations and new acoustic scenarios. For example, a stage set can now be incorporated and the orchestra’s position varied. To achieve a realistic sound assessment, a vocal part – sung by soprano Emilie Sierra, a member of the Bavarian State Opera, and accompanied by the Bavarian State Orchestra – has been integrated into the application for the first time.

"Siemens and the Bavarian State Opera share a long-standing, trust-based partnership marked by a common pursuit of excellence and innovation," said Serge Dorny, General Director of the Bavarian State Opera. “We’re looking forward to the new perspectives that our digital strategy will create and are excited by the

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variety of possible applications that will emerge from the joint Sound of Science project."

"The idea for the Sound of Science application was spawned by the trend toward increasingly shorter rehearsal times and rising concert logistics costs. Our simulation of realistic stage productions enables theater professionals to plan much more precisely in advance, while giving audiences a preliminary impression of the acoustic conditions," added Stephan Frucht, Artistic Director of the Siemens Arts Program.

The technology underlying the Sound of Science is provided by Siemens Simcenter, a portfolio of simulation and testing solutions that has been part of the company's core business for more than 15 years. Simcenter processes impulse response measurements and uses ray tracing to calculate how sound waves propagate in space. Different materials influence reflection – thus creating a venue’s specific acoustics.”

“The benefits of digital twin technology extend well beyond the concert hall, offering transformative advantages across various industry sectors,” said Jean-Claude Ercolanelli, Senior Vice President for Simulation and Test Solutions at Siemens. “The Siemens’ comprehensive Digital Twin facilitates cost reduction, resource optimization, time savings, risk mitigation, enhanced decision-making, and improved collaboration. By visualizing potential challenges in advance, our comprehensive digital twin empowers us to make more informed decisions in the physical world.”

Siemens provides a Sound of Science demonstration application free of charge to selected partners in the international cultural scene. There are currently no plans to commercialize the application. However, the simulation solutions used in the application are available for purchase. Information regarding the possibilities that the Sound of Science can offer other opera houses and concert halls is available on request from the Siemens Arts Program.

This press release is available at https://sie.ag/gecLD

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