Cutting-edge VR in Magdeburg

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The Elbedome provides space sufficient for a team of industrial planners or can be used as a marketing tool that enables as many as thirty visitors to experience virtual environments at the same time. Credit: Fraunhofer-Gesellschaft

Europe`s biggest 3-D mixed reality laboratory is located in Magdeburg. Four meters high and sixteen meters in diameter, the Fraunhofer Institute for Factory Operation and Automation IFF's Elbedome

resembles a hemisphere. It affords companies the opportunity to bring models of machines, systems, factories and even entire cities to life with impressive realism. We interviewed with Elbedome manager Steffen Masik about the lab's distinctive features.

This unique simulation lab reopened last May following extensive upgrading (see the box entitled Immersing in virtual worlds). Mr. Masik, what are the new features of the revamped visualization system?

Rather than just the panorama, the floor can now be used as a projection surface, too. Virtual objects can be introduced in the space and linked with real elements in the Elbedome. The new stereoscopic projection system lets you perceive models in three dimensions. And the Elbedome now features considerably brighter, higher-definition projections and state-of-the-art computer equipment for imaging and simulation.

Can you describe how this technology works? What are the distinguishing features of 3-D mixed reality applications?

Twenty-five high-resolution daylight stereo projectors project images on the floor and panorama and even other objects into space. An automated calibration system helps us quickly adjust to changed projection parameters. Mixed reality applications connect real objects such as workstations, robots or controllers with virtual elements, for instance a machine, system or an entire surrounding factory. A high-precision tracking system enables ergonomic testing of real or virtual prototypes of workstations, systems or machines.
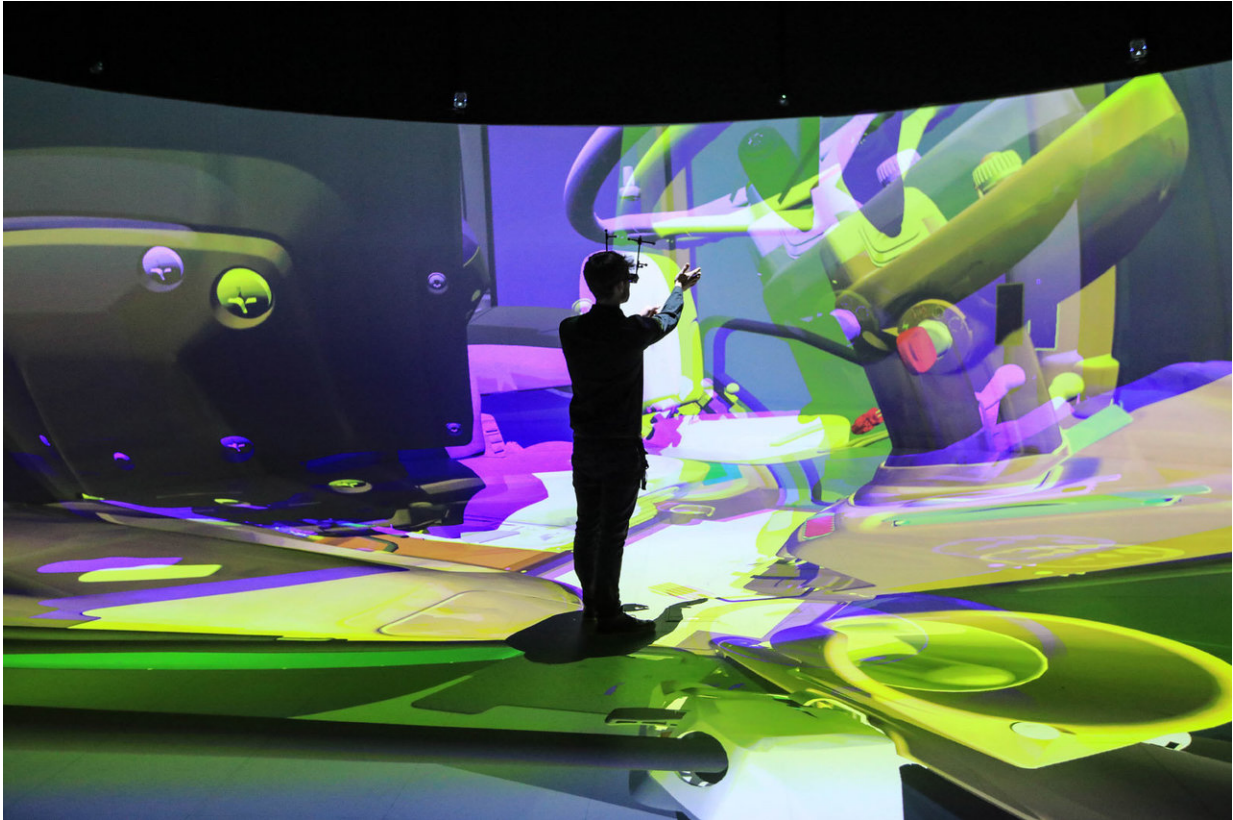
The Elbedome's panoramic and floor projection surface of over 450 m2 make it particularly well suited to display large objects such as machines, systems, factories, and entire cities. Manufacturers use these large-scale visualizations to assess the status of their plans and expedite decision-making. Credit: Fraunhofer-Gesellschaft

What does the Elbedome do best?

The Elbedome has a panoramic and floor projection surface of with more than 450 m2. These huge dimensions make it particularly well suited for displaying large objects such as machines, systems, factories or entire cities. Moreover, the size of the space also allows projecting objects into space as holograms, thus giving users the sensation of being in the midst a virtual world. The Elbedome provides space sufficient for

a team of industrial planners or can be used as a marketing tool that enables as many as thirty visitors to experience virtual environments simultaneously.

What do companies typically use these virtual worlds for?

Manufacturers use virtual realities to assess the status of their plans, expedite decision-making, and support training, communication and marketing actions. Designing a factory, for instance, is a highly complex process. Different professionals collaborate interdisciplinarily and have to understand each other. Virtual realities help combine different types of data and unify different points of view.

What is the advantage of this system and how does it benefit your clients?

Our clients can use the Elbedome as a discovery, learning and creative space and thus improve communication with their clientele effectively, hold unforgettably unique promotional events, train staff effectively, and share experts' experiences. We use it to enable regional businesses in particular to set themselves apart from their competitors and gain more than just regional visibility through innovative planning methods, end-to-end digital transformation and sustainable marketing.

The stereoscopic projection system makes it possible to perceive virtual worlds in the Elbedome in three dimensions. Holographic representation gives users the sense of being in the midst of the projected images. Credit: Fraunhofer-Gesellschaft

You are working on challenges of the future in the mixed reality lab. What cutting-edge topics are you addressing in particular? What technology and application developments are you focusing on?

Fraunhofer IFF is primarily researching solutions that will enable companies to organize their manufacturing lines more reliably, more efficiently and more sustainably and thus developing work systems of the future. As an applications lab, the Elbedome facilitates this research

and provides a one-of-a-kind interface to industry research partners. The Elbedome focuses on the processing and visualization of large design and simulation data sets as well as real-time manufacturing data and on intuitive interaction with the resulting cyber-physical systems. Current architectural, urban planning and medical applications additionally demonstrate that the uses for the Elbedome go far beyond the industrial sector and are virtually boundless.

Who may rent the lab? Who uses it most?

We are happy to make the Elbedome available to any interested company by the hour or even for longer periods. On the one hand, we can use the Elbedome to impressively convey the benefits of digital transformation and Industrie 4.0 tools to companies. On the other hand, companies can bring their own data sets with them, of course, and use the Elbedome for internal and external communication. Naturally, the Elbedome is also available to researchers, especially those from local universities and colleges, and to Fraunhofer colleagues for their industry and research projects.

What development projects are you currently pursuing at the Elbedome?

On the one hand, we are constantly developing our service portfolio further and thus the range of functions as well. In various projects with industry partners, we are identifying design and operating data sets that will be interesting for the Elbedome in the future as well as ways to link and visualize them with other information. On the other hand we are also studying how individuals can work in such environments efficiently and for lengthy periods without getting nauseous or dizzy, for instance.

The Virtual Development and Training Centre VDTC was designated a

European Digital Innovation Hub in 2018. What opportunities does it offer companies in Saxony-Anhalt?

The VDTC was designated a DIH because we have been promoting digital transformation in manufacturing companies in the region for years, are represented with our work in the most important networks and initiatives, and have connections to the most important stakeholders. Our solutions, tools, research specializations and, not least, the Elbedome make us the go-to source of support and contacts for digital transformation in Saxony-Anhalt. Admission to the ranks of European DIHs is enabling us to raise our activities, which we have primarily pursued for companies on a regional level, to the European level. We have come to realize in recent months that our designation as a DIH means a bit more visibility for us. This now has to be translated into benefits for companies in the region. The DIH network enables us to afford companies access to new partners and new knowledge, which they may not be able to find locally. On the other hand, we are also able to work with industry partners and serve as the liaison for inquiries from abroad in order to advance the internationalization of regional companies, especially innovative SMEs. The latter has particularly high priority in Saxony-Anhalt. We are collaborating closely with the Ministry of Economic Affairs, Science and Digitalisation to expand the DIH's activities and promote entrepreneurship and start-ups with other partners in the state.

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