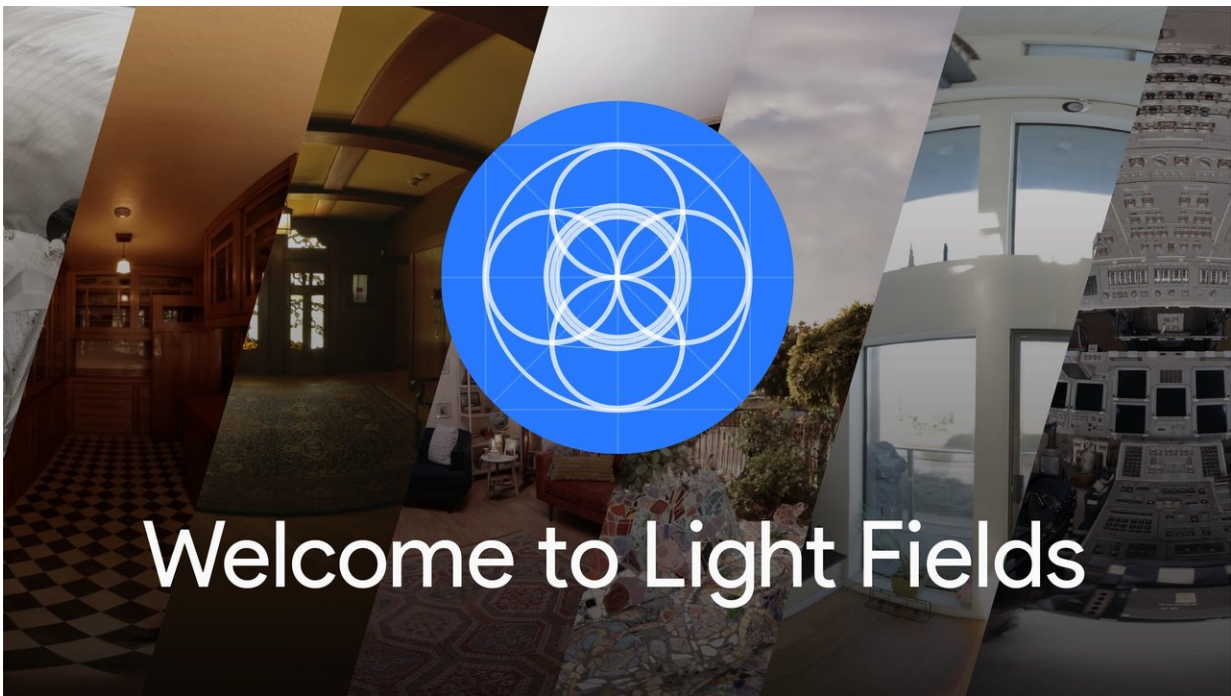


Google unveils new virtual reality experience at SIGGRAPH 2018

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A team of leading researchers at Google, will unveil the new immersive virtual reality (VR) experience "Welcome to Lightfields" at ACM SIGGRAPH 2018. Credit: Google/Overbeck

Google has unveiled a new virtual reality (VR) immersive experience based on a novel system that captures and renders high-quality, realistic images from the real world using light fields. Created by a team of leading researchers at Google, Welcome to Light Fields is the tech

giant's splash into the nascent arena of light fields VR experiences, an exciting corner of VR video technology gaining traction for its promise to deliver extremely high-quality imagery and experiences in the virtual world.

Google released Welcome to Light Fields earlier this year as a free app on Steam VR for HTC Vive, Oculus Rift, and Windows Mixed Reality headsets. The creators will demonstrate the VR experience at SIGGRAPH 2018, in the Immersive Pavilion, a new space for this year's conference. The Pavilion is devoted exclusively to virtual, augmented, and mixed reality and will contain: the Vrcade, a space for VR, AR, and MR games or experiences; the VR Theater, a storytelling extravaganza that is part of the Computer Animation Festival; and the well-known Village, for showcasing large-scale projects. SIGGRAPH 2018, held 12-16 August in Vancouver, British Columbia, is an annual gathering that showcases the world's leading professionals, academics, and creative minds at the forefront of computer graphics and interactive techniques.

Destinations in Welcome to Light Fields include NASA's Space Shuttle Discovery, delivering to viewers an astronaut's view inside the flight deck, which has never been open to the public; the pristine teak and mahogany interiors of the Gamble House, an architectural treasure in Pasadena, CA; and the glorious St. Stephen's Church in Granada Hills, CA, home to a stunning wall of more than 14,000 pieces of glimmering stained glass.

"I love that [light](#) fields in VR can teleport you to exotic places in the [real world](#), and truly make you believe you are there," says Ryan Overbeck, software engineer at Google who co-led the project. "To me, this is magic."

To bring this experience to life, Overbeck worked with a team that included Paul Debevec, senior staff engineer at Google, who managed

the project and led the hardware piece with engineers Xueming Yu, Jay Busch, and Graham Fyffe. With Overbeck, Daniel Erickson and Daniel Evangelakos focused on the software end. The researchers designed a comprehensive system for capturing and rendering high-quality, spherical light field still images from footage captured in the real world. They developed two easy-to-use light field camera rigs, based on the GoPro Hero4action sports camera, that efficiently capture thousands of images on the surface of a sphere. Those images were then passed through a cloud-based light-field-processing pipeline.

Among other things, explains Overbeck, "The processing pipeline uses computer vision to place the images in 3-D and generate depth maps, and we use a modified version of our vp9 video codec [video formatting] to compress the light field data down to a manageable size." To render a light field dataset, he notes, the team used a rendering algorithm that blends between the thousands of light field images in real-time.

The team relied on Google's talented pool of engineers in computer vision, graphics, video compression, and machine learning to overcome the unique challenges posed in light fields technology. They also collaborated closely with the WebM team (who make the vp9 video codec) to develop the high-quality light field compression format incorporated into their system, and leaned heavily on the expertise of the Jump VR team to help pose the images and generate depth maps. (Jump is Google's professional VR system for achieving 3-D-360 video production at scale.)

Indeed, with Welcome to Light Fields, the Google team is demonstrating the potential and promise of light field VR technology, showcasing the technology's ability to provide a truly immersive experience with a level of unmatched realism. Though light fields technology has been researched and explored in computer graphics for more than 30 years,

practical systems for actually delivering high-quality light field experiences has not yet been possible.

Part of the team's motivation behind creating this VR light field experience is to invigorate the nascent field.

"Welcome to Light Fields proves that it is now possible to make a compelling light field VR viewer that runs on consumer-grade hardware, and we hope that this knowledge will encourage others to get involved with building light field technology and media," says Overbeck. "We understand that in order to eventually make compelling consumer products based on light fields, we need a thriving light field ecosystem. We need open light [field](#) codecs, we need artists creating beautiful [light field](#) imagery, and we need people using VR in order to engage with light fields."

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