

# Mission to Mars in a 'three-dimensional time machine'

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Is virtual reality here to stay? Based on my own experiences with Mars 2030, an advanced version of VR that took me to the surface of the Red Planet, the answer is "Yes!"

My first virtual steps on Mars were uncertain - the terrain is incredibly rocky.

I walked carefully, threading my way through brownish orange rocks as I headed to the Mars Rover. It was parked next to Mars Habitat, NASA's latest version of a long-term habitat for humans on a different planet.

As I approached the Rover, a voice instructed "Look at the Rover, that will take you inside."

I looked, and suddenly was inside looking out.

This wasn't a completely new experience. Earlier in the day, I'd watched Apple co-founder Steve Wozniak pull off the same stunt.

At Nvidia's big GPU Technology Conference in San Jose last month, Woz donned a VR headset at a remote location and bounced around Mars in the Rover while a crowd of several thousand watched on a giant screen.

I got to do the same thing later in the day in a booth where a long line of people waited patiently for their own Mars trip.

The game company Fusion, based in Florida, teamed up with Nvidia to create Mars 2030 - the highest resolution, scientifically accurate [virtual reality](#) experience possible using Nvidia's most advanced technology, the gaming graphics card GeForce 980Ti and an HTC Vive headset.

The project pushed technology forward, said Zvi Greenstein, head of virtual reality business development at Nvidia, based outside San Jose. "It has the latest in scientific research, the latest in visuals and real-time rendering, and the latest in sound, all coming together."

"The idea is not to build a game, but real-life experiences, pushing performance with the highest regard to scientific accuracy," said Greenstein.

Julian Reyes of Fusion came up with the idea for Mars 2030.

"You're putting someone into a 3-dimensional time machine. There's something very special about that," he said.

"It is also getting to be a kind of steppingstone into artificial intelligence," Reyes said. "VR and AI running in parallel with each other are really going to change the way we digest information and produce these different types of experiences that don't confine information to a 2-D monitor. You're seeing information while you're inside a three-dimensional space. The Mars project is a vision of that future."

Fusion intends to make the Mars 2030 experience available online for free this fall.

It's so compelling, I can see myself owning a VR headset and some gaming gear one day. That's not cheap, but increasing popularity should eventually bring the price down.

The Mars 2030 trip was one of three VR experiences available at the conference. The other two, an ascent of Mount Everest and a trip through Nvidia's new lobby, were nearly as impressive.

On Everest, I had to tiptoe along a narrow strip of ice-covered rock to reach some pull-ropes. Grabbing the ropes, I was able to pull myself up a sharp escarpment and then scramble up to the top of Everest.

From there, I had a 360-degree view of the Himalayas, until a passing cloud enveloped me and the climb ended.

When he got the idea for the project, Fusion's Reyes reached out to Sydney Do of MIT, who co-authored a report on the feasibility of a private Mars mission program. Do helped Reyes get started, sending him off with a stack of NASA reports.

Reyes said he emailed the authors of the reports, and over the course of about 18 months worked with NASA's Langley Research Center and Johnson Space Center, finally reaching an agreement with NASA at the end of 2015.

Under that agreement, NASA is letting Fusion base Mars 2030 on operational and hardware concepts that the agency is currently studying. Reyes said NASA even let Fusion's people ride around a parking lot at Johnson Space Center in the six-wheeled Mars Rover. A Source Sound team from Los Angeles recorded the sound, which adds to the realism of the experience.

The Fusion team ended up creating a realistic 8-by-8-kilometer section of the surface of Mars, based on satellite imagery and data gathered in years of exploration.

Their "rock star," technical artist David Flamburis created a million

rocks using the "Unreal Engine 4," a set of tools for video game developers.

"I decided to create five different classes of rocks," he said. "One was kind of like magma and basalt combined, which was ejecta from eruptions. There were a lot of broken pieces of basalt, and a lot of pure black lava stone, and smooth natural-occurring stone that might have been worn down over a billion years ago. You'll see rocks have different texture, feel to them as you wander through."

The team is still working on features.

One of several exploratory missions "will lead you down into a collapse, and reveal the lava tube itself," Flamburis said. "It's almost like sticking your head out of the window on top of two Empire State Buildings and looking down. We're trying to get that feel."

If this is where VR is headed, armchair explorers are in for some thrills.

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