


**Hewlett Packard
Enterprise**

ONE GIANT LEAP FOR EDGE COMPUTING

**OrbitsEdge delivers insights from space to
power the next chapter of innovation**

Printing 3D hearts that actually work. Growing crystal structures with unparalleled precision. Developing new materials that have never been produced on our planet. These are just a few things that can happen outside the pull of Earth's gravity, and they'll soon be enabled by an initiative that delivers compute power to the ultimate edge—in space.

50 years after the space missions that put the first humans on the moon, speculators are still drawing comparisons between the Apollo Guidance Computer and a pocket calculator.¹ Surely by now, such analogies are no longer relevant.

"Right now, people don't realize how few compute resources exist in space," says Sylvia France, CEO of OrbitsEdge. "The day-to-day operations on the International Space Station (ISS) are powered by something that's more equivalent to an iPhone."

OrbitsEdge is a Florida-based startup dedicated to discovering what's possible when research and industry are free from earthbound data centers. But sustaining modern compute resources in the harsh conditions of space is a challenge that's still frustratingly elusive. And it's not for lack of trying.

Hard truths about celestial computing

According to France, it's all about hardening: the processes that ensure microprocessors, transistors, and circuit boards will survive everything from the rigors of launch to the extreme temperature fluctuations of low-earth orbit. "Hardening is protection from everything in the environment—radiation, heat, extreme cold, dust—and any event that could occur—shock, vibrations, for example."

¹ Alexis C. Madrigal, "Your Smart Toaster Can't Hold a Candle to the Apollo Computer," The Atlantic, July 16, 2019



INDUSTRY: AEROSPACE
REGION: UNITED STATES

VISION

Bring high power compute resources to low-earth orbit to enable data insights in space

STRATEGY

Build a hardened computing platform that survives and thrives in harsh conditions

OUTCOMES

- Enables customers to launch space initiatives 3–5 years faster
- Delivers data insights at the edge in space, eliminating roundtrip data latency
- Supports discoveries only possible in microgravity environments

Hardening is a rigorous process. And a slow one—so much so that by the time most gear is hardened for use in space, technology has already moved forward by leaps and bounds, rendering its value dubious for today's applications.

"Computing in space has simply not kept pace with terrestrial computing," France relates. "And because of that, applications have to be rewritten to operate on this hardened, dated technology. It creates a situation where your processing ability is compromised, and you're paying more to develop software that will run on it."

Space: Now open for business

In fact, typical development times run between three and five years just to get an environment viable in space. "... not to mention launching their own satellite or hiring their own aerospace expertise, which is very expensive," France says.

"So we thought: What if you could find a way to put a modern data center in low-earth orbit," France posits. "If we could free businesses to leverage their existing IT staff and software stack—it could help them get to space a lot faster."

That's the value proposition of OrbitsEdge, and when it launches its first edge compute system into low-earth orbit, it could change everything. As France says: "Space is now open for business."



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— SYLVIA FRANCE, CEO, ORBITSEDGE

Computing at the source

Gone are the days of government agencies dictating and designing every aspect of a trip to space. The privatization of space travel is opening up the floodgates of opportunity, and data is going to be a big part of it. So why can't spaceborne endpoints just stream raw data down to terrestrial data centers, where conditions are more predictable, and infrastructure is plentiful?

"I don't think people realize the vast amounts of data that are actually being created in space," France explains. "NASA has petabytes of data being generated in space every day, and they can't get it all back to earth. Just imagine the insights we're missing. That's why we need processing power closer to the source."



Origins: Catching a universal dream

The story of OrbitsEdge seems almost like destiny: the right combination of aerospace, innovation, and IT knowhow all coming together at just the right moment in our history.

Rick Ward, Founder of OrbitsEdge, came up with the idea while standing in the shadow of the famed Launch Pad 19 at Cape Canaveral. "There's always been a problem getting high powered computing into space," Ward says. "So I was just standing there thinking, 'let's build a box, put the compute resources inside, and launch it into space.'"

With the help of Bentley Radcliffe, OrbitsEdge Executive Chairman and Co-Founder, and Ross Tierney, head of engineering at OrbitsEdge, the team fleshed out the idea for what they call the SatFrame: a proprietary satellite bus designed to protect sensitive hardware while providing years of constant, maintenance-free performance in low-earth orbit.

When the concept came together, Ward burst into action, creating a mockup of the SatFrame out of Legos.

France joined the team later, drawn in by a passion for the project that is practically in her DNA. She's a self-proclaimed "Space Baby"—a daughter of an engineer on the Gemini and Apollo programs who grew up in Florida NASA culture. "My dad worked on the chest-packs that collected all the vital signs of the astronauts," France recalls. "Today, you could do all that with an Apple Watch, but back in the early days of NASA, the tech didn't exist. He built those with parts from Radio Shack."

Together, they bring the right combination of expertise, innovation, and child-like wonder to the challenge of celestial computing.

And the team's efforts have not gone unnoticed. Recently, OrbitsEdge was a top-10 finalist in NASA's iTech competition—an innovation initiative between public entities and private enterprise—recognizing the team's potential to accomplish future exploration goals.

For instance, there are huge volumes of data just coming from Earth-observation satellites for weather forecasting, transportation, and the shipping industry. But according to the National Oceanic and Atmospheric Administration, around 70% of the planet's surface is obscured by cloud cover at any given time, rendering that imagery obsolete.

Rather than purge that data—which could be valuable later—OrbitsEdge is building that missing piece of space infrastructure to analyze, consolidate, store, and transmit just the cleansed data back to earth. It's just one example of how analytics in space could maximize data collection.

Insights in orbit

To make its dream a reality, the team knew it couldn't use just any off-the-shelf hardware. OrbitsEdge needed a tested edge compute platform to be the heart of its SatFrame system, and it needed a partner with experience in spaceborne computing and a comfort level with space program culture.

HPE had both. "People might not realize that HPE had a spaceborne compute system on the ISS for over a year, testing high-performance computing and AI in space," France relates. "And it was very successful. We knew immediately we

wanted to work with HPE because they had actually done it, and we wanted to apply those insights to OrbitsEdge."

In addition to leveraging HPE's expertise in spaceborne computing, OrbitsEdge also gains access to engineering resources and an existing product range available through HPE's OEM program. The HPE Edgeline EL8000 Converged Edge System is already purpose-built for less-than-ideal, space-constrained environments. Its popularity for use in everything from Formula 1 race cars to the harsh conditions of manufacturing floors made it a natural for OrbitsEdge.

"The reason we chose HPE Edgeline Converged Edge Systems for our first launch is because it already has so many of the features we need," France explains. "From the hardware footprint to the horsepower we need, it was the most logical choice for our SatFrame platform."

Because opportunities in space reach well beyond standard commercial ventures, it's important that the platform is ready for any initiative that comes along. "We're looking into the kinds of applications and security profiles that the Department of Defense and research universities would require,

and the HPE Edgeline EL8000 already meets those requirements," France says.

Edge-to-cloud, above the clouds

With a powerful edge computing solution in low-earth orbit, the team can offer customers the ability to gain insights at the edge without experiencing delays due to roundtrip data transfer times. "We like to say, if you can do it in a data center on earth, now you can do it in space," Ward explains. "Having computing and insight at the edge is going to enable a whole new frontier for manufacturers to harness the advantages of microgravity."

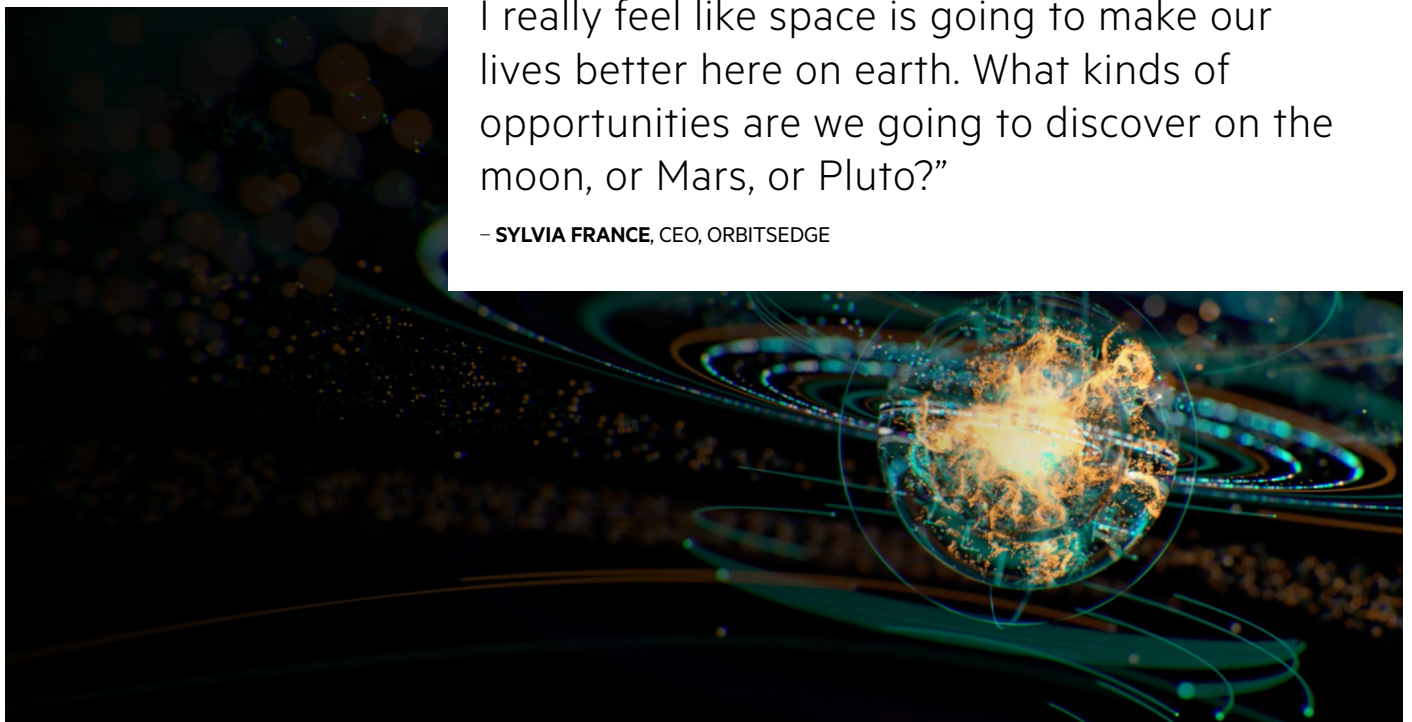
The team forecasts not just a few but a "constellation" of OrbitsEdge SatFrames in the near future. "Our first constellation is going to have 30 satellites, and our second will have 60, so we'll be able to relay and store data in the constellation," France says.

And not all that data has to remain in space. "We're working with service providers to enable the streaming of data to major cloud services for a complete edge-to-cloud solution," France explains.



I really feel like space is going to make our lives better here on earth. What kinds of opportunities are we going to discover on the moon, or Mars, or Pluto?"

— SYLVIA FRANCE, CEO, ORBITSEDGE





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– RICK WARD, FOUNDER, ORBITSEDGE



Moving humanity forward

“The HPE partnership has been great—they challenge us for applications they see, and we challenge them for opportunities that we see,” France says. “It’s really broadened our horizons as an organization.”

That partnership is at the forefront of great opportunity—not just for OrbitsEdge and HPE, but for humanity. “I really feel like space is going to make our lives better here on earth. What kinds of opportunities are we going to discover on the moon, or Mars, or Pluto?” France asks. “I think it’s really going to move humankind forward.”

SOLUTION

- HPE OEM Program

HARDWARE

- HPE Edgeline EL8000 Converged Edge System

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hpe.com/us/en/what-is/edge-computing.html



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