



5 ways edge-to-cloud technology has turned science fiction into everyday reality

What was once “fantastic” is now “ordinary”—thanks in large part to advances in edge computing and cloud connectivity.



When machines can speak and write better than many humans, and 7 billion people carry the equivalent of a supercomputer in their pockets, you know we’re living in a different world than most of us were born into. Of course, we saw glimpses of it growing up, thanks to popular science fiction.

“What’s important about science fiction is how it speculates on how changes in technology change us as people,” says Kirk Bresniker, HPE Fellow and chief architect at Hewlett Packard Labs. “Does it dehumanize us, or does it allow us to more fully realize our most authentic selves?”

The future technologies that imaginative science fiction writers like Gene Roddenberry, Arthur C. Clarke, and Philip K. Dick envisioned are becoming real, thanks to major breakthroughs in artificial intelligence (AI), computing power, and connectivity. And that means the future societies they foretold, from utopian to nightmarish, are also becoming real.

AI, compute, and connectivity are no longer isolated in the corporate data center. Instead, they increasingly permeate our world as edge-to-cloud platforms of intelligent social infrastructure. The edge-to-cloud technology brings massive computing resources to nearly every area of our lives while collecting data that fuels more intelligent machine learning models.

Edge-to-cloud technology will ultimately help us solve the big problems, like unlocking the mysteries of the Big Bang or finding a cure for Alzheimer’s, says Bresniker. After meeting with Alzheimer’s researchers in Germany, HPE technology helped them analyze genome data significantly faster. This process used to take them approximately 20 minutes; now it takes place in seconds and uses much less energy, he explains.

But it all starts with a vision. So, here are five once-fantastic technologies that now seem (almost) ordinary, thanks partly to edge-to-cloud innovations.

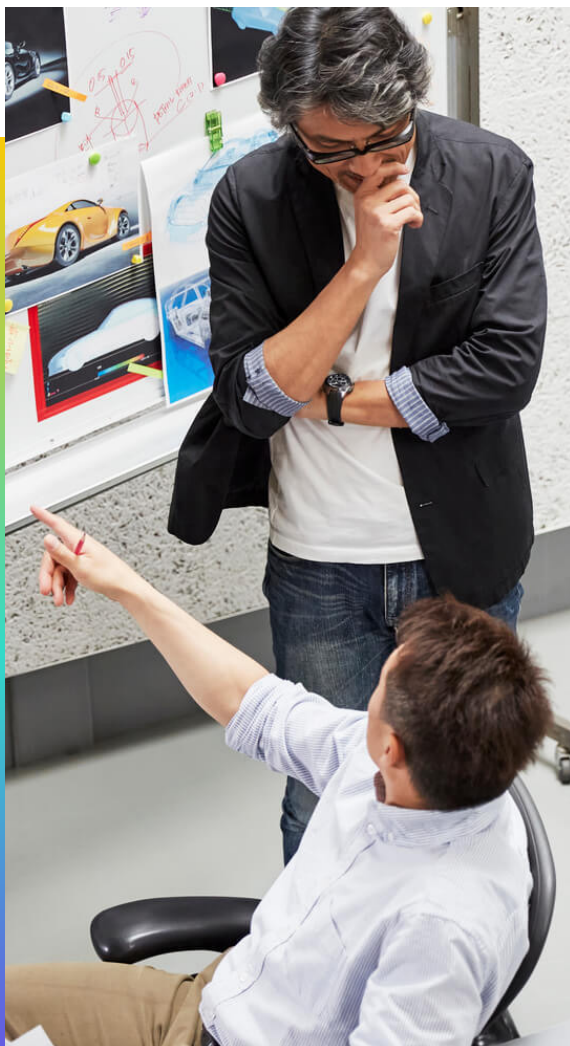
Ambient computing

An all-knowing, omnipresent digital intelligence that responds to voice commands has been a staple of science fiction for decades. Think “Computer” in the original “Star Trek” series (1966) or the HAL 9000 in “2001: A Space Odyssey” (1969).

Machine learning and edge computing have made the miraculous feat of having computers communicate in everyday language feel like no big deal. The only difference? Instead of saying “computer” or “Hal,” we say “Alexa,” “Hey Siri,” or “OK Google™.”

In 2023 alone, an estimated 200 million smart speakers will be sold, sitting in homes and offices, quietly listening.¹ These edge devices are constantly communicating with cloud servers, using natural language processing to understand questions and retrieve answers. And that, in turn, has introduced computing to a generation that has often found it too challenging in the past.

For example, Bresniker says he tried unsuccessfully to set up technology for his mother for years. “I’d get it set up and walk her through how to use it, but after I left, she wouldn’t use it on her own. I came home once and she’d put black tape over the blinking 00:00 on her VCR rather than try to reset the clock,” he says. Then his sister bought an Amazon Echo device for her. “Suddenly, all the things I’ve wanted her to be able to do—to get a hold of us, to access the internet, music, streaming, and so on—she just yells at Alexa. It’s finally given her an entree into all this technology.”



Autonomous automobiles

From KITT in “Knight Rider” (1982) to Johnny Cab in “Total Recall” (1990), intelligent autonomous vehicles have the ride of choice in the sci-fi future. And now self-driving cars, or a reasonable approximation, are cruising down our highways.

Advancements in computer vision and AI-powered sensors have made features like adaptive cruise control, lane-departure warnings, and hands-free steering standard in many brand-new models. The reason is simple: most of the time, technology makes cars safer.

Modern cars are edge devices on wheels, containing hundreds of microprocessors and millions of lines of code. They collect as much as 25 GB of data per hour while making thousands of decisions independently at the edge.² However, today’s cars are still only semi-autonomous—safety drivers are still required behind the wheel in case something goes awry.

That’s slowly changing. Driverless robo-taxis are already on the streets in Beijing, and U.S. transport companies are running experiments with self-driving trucks in Texas. But without major changes to road infrastructure, sustainable electrical generation and distribution, and possibly new ownership models, most of us are unlikely to experience fully autonomous vehicles for many years to come, notes Bresniker.

¹ [Smart speakers—Statistics & Facts](#), Statista, March 3, 2023

² [“Autonomous cars generate more than 300 TB of data per year.”](#) Tuxera, July 2, 2021

Holographic doctors

“Star Trek: Voyager” (1995) featured an emergency medical hologram—a 3D virtual doctor. Memorably portrayed by actor Robert Picardo, The Doctor dispensed healthcare and acerbic commentary with equal aplomb. Nearly three decades later, the convergence of telemedicine with AI and edge computing is bringing remote medical care to the farthest reaches of the planet—and beyond.

In what may be the most sophisticated house call ever made, NASA flight surgeon Dr. Josef Schmid “holoported” to the International Space Station in October 2021 to check on the well-being of astronauts in orbit 250 miles above us.

Closer to earth, high-bandwidth video links, connected devices like digital stethoscopes and glucose monitors, and medicine delivery drones are helping to bridge the gap between patients and providers hundreds of miles away, using the cloud to deliver information securely. Robotic, augmented, and virtual reality services, enabled by low-latency 5G hotspots, will bring us even closer to an encounter with The Doctor, or something much like him.

“Virtually all the pieces are here: natural language processing, our ability to query the entire body of medical knowledge, as well as the ability to generate photo-realistic images and simulate a compassionate bedside manner,” says Bresniker. “We’ll be able to deliver whole-body healing, synthesized on the fly, localized to language and culture, whenever we need it.”

Bionic humans

“The Six Million Dollar Man” (1973) remains ahead of its time in its predictions about the merger of humans and machines. So far, science has yet to develop bionic legs that can travel 60 mph, an artificial arm strong enough to lift a bulldozer, or a digital eye with a 20x zoom lens. But modern prosthetics have come a long way since Steve Austin crashed his experimental aircraft, and edge computing has played a significant role in their development.

In 2018, AT&T and prosthetics maker Hanger developed a connected artificial leg containing an accelerometer, a gyroscope, a magnetometer, and an LTE modem. The device syncs to the cloud, uploading data to the wearer’s medical providers about how the limb is being used so they can help improve fit and performance.

In 2024, Atom Limbs plans to introduce a realistic-looking prosthetic arm controlled by signals from the human brain. The Atom Touch will also be able to relay information back to the brain via touch sensors embedded in the fingers.

Bionic eyes (a.k.a. retinal implants) have been around in crude form since 2009, restoring partial vision to blind patients. Now, researchers at the University of California, Santa Barbara, are looking at using AI to create smart bionic eyes that transmit realistic images directly to the visual cortex. Similarly, cochlear implants can restore something close to normal hearing by directly stimulating the auditory nerve.

But what’s bringing this vision to the widest number of people isn’t the wholesale replacement of limbs or organs, says Bresniker. It’s the ability to implant sensors in our bodies and generate insights using edge devices such as mobile phones.

“Continuous real-time monitoring and local compute resources are enabling people with health issues to lead fuller lives,” he notes.

Personal robots

Perhaps, nothing screams “the future” more than robots. From mechanized house cleaners like Rosie in “The Jetsons” (1962) through the perpetually worried interstellar diplomat C-3PO in “Star Wars” (1977), and the replicants in “Blade Runner” (1982), we are rich in fictional humanoid machines.

But where George and Jane Jetson had Rosie, we’ve got the Roomba vacuum and the Braava Jet floor cleaner, which can communicate with each other via the cloud. When Roomba finishes its work, it signals Braava to start mopping.

Robotic arms have been used in manufacturing for decades and are now beginning to transform the service industry. For example, Jamba has begun deploying automated kiosks using AI and robot arms that can simultaneously make up to nine smoothies. Customers place their orders using a kiosk touchscreen or a mobile app.

There are now more than a dozen home robots on the market designed to entertain us, teach us how to play the piano, control the smart devices in our homes, lift us when we’ve fallen, or alert other humans when we need help—all driven by AI and connected to the cloud.

Using robots for menial or repetitive tasks can free up our time and allow us to do higher level, more productive work, notes Bresniker. But they also come with costs, such as devaluing underpaid workers and displacing entry-level and physical labor jobs.

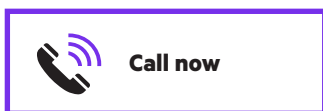
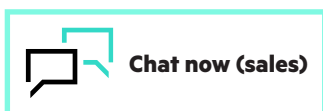
The bottom line

It’s fun to look back at the past and see how we imagined the future. But the same technologies that enabled once-fictional inventions to become a reality can also be harnessed to transform your business.

Making data accessible across the enterprise, from the data center to the edge and back, opens new opportunities across communications, transportation, manufacturing, retail, and healthcare. HPE GreenLake is the edge-to-cloud platform organizations use to turn yesterday’s once-fanciful notions into reality.

“If you want to crack the really hard problems and create systems that are sustainable, equitable, and secure, the data and the compute have to be distributed,” says Bresniker. “That demands edge-to-cloud technology.”

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