



## TECHNICAL NEWS

Department of Computer Applications

# NEWSLETTER

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## NASA's Opportunity Rover Mission on Mars Comes to End

**N**ASA's Opportunity rover mission is at an end after almost 15 years exploring the surface of Mars and helping lay the groundwork for NASA's return to the Red Planet.

The Opportunity rover stopped communicating with Earth when a severe [Mars-wide dust storm](#) blanketed its location in June 2018. After more than a thousand commands to restore contact, engineers in the Space Flight Operations Facility at NASA's Jet Propulsion Laboratory (JPL) made their last attempt to revive Opportunity Tuesday, to no avail. The solar-powered rover's final communication was received June 10.

"It is because of trailblazing missions such as Opportunity that there will come a day when our brave astronauts walk on the surface of Mars," said NASA Administrator Jim Bridenstine. "And when that day arrives, some portion of that first footprint will be owned by the men and women of Opportunity, and a little rover that defied the odds and did so much in the name of exploration." Designed to last just 90 Martian days and travel 1,100 yards (1,000 meters), Opportunity vastly surpassed all expectations in its endurance, scientific value and longevity. In addition to exceeding its life expectancy by 60 times, the rover traveled more than 28 miles (45 kilometers) by the time it reached its most appropriate final resting spot on Mars — Perseverance Valley.

All of the off-roading and on-location scientific analyses were in service of the Mars Exploration Rovers' primary objective: To seek out historical evidence of the Red Planet's climate and water at sites where conditions may once have been favorable for life. Because liquid water is required for life, as we know it, Opportunity's discoveries implied that conditions at Meridiani Planum may have been habitable for some period of time in Martian history.

Each time the rover faced an obstacle, Opportunity's team on Earth found and implemented a solution that enabled the rover to bounce back. However, the massive [dust storm](#) that took shape in the summer of 2018 proved too much for history's most senior Mars explorer.

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## New NASA telescope to explore origins of universe

**N**ASA will launch a new space telescope in 2023 that could provide a glimpse of the first moments in the history of the universe, and explore how common are the ingredients for life in our galaxy's planetary systems, the US space agency said Thursday.

The Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer (SPHEREx) mission is a planned two-year mission funded at \$242 million, according to NASA. "I'm really excited about this new mission," NASA Administrator Jim Bridenstine said in a statement.

SPHEREx will survey the sky in optical as well as near-infrared light which, though not visible to the human eye, serves as a powerful tool for answering cosmic questions. Astronomers will use the mission to gather data on more than 300 million galaxies, as well as more than 100 million stars in our own Milky Way, NASA said.

"This amazing mission will be a treasure trove of unique data for astronomers," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate. "It will deliver an unprecedented galactic map containing 'fingerprints' from the first moments in the universe's history. And we'll have new clues to one of the greatest mysteries in science: What made the universe expand so quickly less than a nanosecond after the big bang?" Zurbuchen said.

SPHEREx will survey hundreds of millions of galaxies near and far, some so distant their light has taken 10 billion years to reach Earth.

In the Milky Way, the mission will search for water and organic molecules — essentials for life, as we know it — in stellar nurseries, regions where stars are born from gas and dust, as well as disks around stars where new planets could be forming.

Every six months, SPHEREx will survey the entire sky using technologies adapted from Earth satellites and Mars spacecraft.

The mission will create a map of the entire sky in 96 different colour bands, far exceeding the colour resolution of previous all-sky maps. It also will identify targets for more detailed study by future missions, such as NASA's James Webb Space Telescope and Wide Field Infrared Survey Telescope, the US space agency said.

## NTU, MIT Scientists Develop AI That Can Predict Material Properties After Straining

Scientists from Nanyang Technological University, Singapore, in collaboration with researchers from the Massachusetts Institute of Technology (MIT) in the US and the Skolkovo Institute of Science and Technology in Russia, have developed a machine learning approach that can predict changes to the properties of materials from straining the material.

This work could lead to the possibility of engineering new materials with tailored properties for potential use in communications, information processing, and energy fields, said a statement released by NTU.

In a paper published earlier this week in the Proceedings of the National Academy of Sciences, the authors demonstrated their use of Artificial Intelligence to identify the most energy-efficient strain pathways that could transform diamond into more effective semiconductors.



NANYANG  
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When a semiconductor material is bent or strained, the atoms in its structure are perturbed, thus changing its properties such as how it conducts electricity, heat or the transmission of light. This process is known as 'strain engineering'.



**Massachusetts  
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As a prelude to this work, last year the NTU Singapore and MIT authors reported in Science, that diamond nanoneedles could be bent and stretched as much as 9 per cent, which was surprising given that diamond is the hardest natural material known.

And in earlier research with industrial applications, "strain engineering" was used on silicon processor chips, where a one per cent strain allowed electrons to move faster, resulting in up to 50 per cent higher processing speeds.

## HCL 'IBM collaborate to accelerate clients' hybrid cloud journey

**H**CL today announced new re-platforming and refactoring services to enable enterprises to build and migrate applications to IBM Cloud Private from within the company's HCL Cloud Native Labs. The services will be orchestrated and available from HCL's Cloud Native Labs in London, New York, and Noida, later this year.

HCL offerings include cloud strategy planning, application transformation, cloud-native cultural transformation, proof of concept building, and next-generation cloud native software development services – all of which are being extended to include the IBM Cloud offerings.

Additionally, HCL will offer services to help migrate ISV solutions to IBM Cloud. Finally, HCL and IBM plan to collaborate to assist clients in building joint solutions that include IBM AI capabilities.

HCL will provide the necessary services to enable a customer's cloud native journey covering portfolio assessment, platform design / build, applications transformation, software engineering, and platform operations, which makes this collaboration significant," said Kalyan Kumar, HCL Corporate Vice President and CTO. "The HCL teams will now help customers to understand the Art of the Possible and see where ICP / IBM hybrid cloud can enable their cloud native journey. The HCL Cloud Native Labs would become a single location where the complete .

"Application & Platform Transformation is a critical entry point for organizations on their hybrid cloud journey, yet we see that only few enterprise workloads have been modernized to date," said Denis Kennelly, General Manager for IBM Hybrid Cloud Integration. "Our IBM hybrid cloud solutions combined with the expertise HCL will simplify this for clients and accelerate their journey to the cloud enabled via their Cloud Native Labs.



## Amazon Meshes with Eero

**A**mazon has scooped up mesh WiFi network maker Eero, the home network company known for making an easy-to-set-up product that can blanket a home with high-quality WiFi.

"We are incredibly impressed with the Eero team and how quickly they invented a WiFi solution that makes connected devices just work," said Dave Limp, Amazon's senior vice president for devices and services. "We have a shared vision that the smart home experience can get even easier, and we're committed to continue innovating on behalf of customers."

### High-Performance Wi-Fi :-

To optimize wireless coverage of a home network, Eero uses multiple access points. The system can be customized to eliminate "dead spots" often found in traditional WiFi networks in order to deliver high performance and reliable networking throughout a home.

A system can be set up in less than 10 minutes with the easy-to-use Eero app, according to Amazon. What's more, Eero automatically communicates with its servers in the cloud, so it's continually updating, fixing and improving itself without human intervention.

"From the beginning, Eero's mission has been to make the technology in homes just work," said Nick Weaver, the company's CEO.

"We started with WiFi because it's the foundation of the modern home," he continued. "Every customer deserves reliable and secure WiFi in every room."



### Create 'Malicious' Artificially-Intelligent Writer

A team of researchers who have built an artificially-intelligent writer say they are withholding the technology as it might be used for "malicious" purposes.

OpenAI, based in San Francisco, is a research institute backed by Silicon Valley luminaries including Elon Musk and Peter Thiel

OpenAI said its system was able to produce coherent articles, on any subject, requiring only a brief prompt. The AI is "unsupervised", meaning it does not have to be retrained to talk about a different topic.

It generates text using data scraped from approximately 8m webpages. To "feed" the system, the team created a new, automated method of finding "quality" content on the internet.

Rather than scrape data from the web indiscriminately, which would have provided a lot of messy information, the system only looked at pages posted to link-sharing site Reddit. Their data only included links that had attracted a "karma" score of 3 or above, meaning at least three humans had deemed the content valuable, for whatever reason.

"This can be thought of as a heuristic indicator for whether other users found the link interesting, educational or just funny," the research paper said.

The AI generates the story word-by-word. The resulting text is often coherent, but rarely truthful - all quotes and attributions are fabricated. The sentences are based on information already published online, but the composition of that information is intended to be unique.

Sometimes the system spits out passages of text that do not make a lot of sense structurally or contain laughable inaccuracies.

In one demo given to the BBC, the AI wrote that a protest march was organised by a man named "Paddy Power" - recognisable to many in the UK as being a chain of betting shops.

etitive text, world modelling failures (eg "We have observed various failure modes," the team observed. "Such as rep the model sometimes writes about fires happening under water), and unnatural topic switching."

In calling around for an independent view on OpenAI's work, it became clear that the institute is not altogether popular among many in this field. "Hyperbolic," was how one independent expert described the announcement (and much of the work OpenAI does).

"They have a lot of money, and they produce a lot of parlour tricks," said Benjamin Recht, associate professor of computer science at UC Berkeley.

"It's not a matter of whether nefarious actors will utilise AI to create convincing fake news articles and deepfakes, they will," she told the BBC.

"Platforms must recognise their role in mitigating its reach and impact. The era of platforms claiming immunity from liability over the distribution of content is over. Platforms must engage in evaluations of how their systems will be manipulated and build in transparent and accountable mechanisms for identifying and mitigating the spread of maliciously fake content.

## Intel's Ultra-Rare, Auction-Only Core i9-9990XE Gets Benchmarked

Intel and AMD have both been exploring just what kind of high-end chips the consumer market will bear in recent years, with high-profile updates and improvements to products like Threadripper and the Core X family, respectively. Intel's latest ultra-high-end chip, the 14-core Core i9-9990XE, isn't even available to OEMs via the traditional purchasing paths. Instead, OEMs can bid at auction to purchase these products.

Unlike the Core i-9980XE or similar chips, the major draw of the Core i9-9990XE isn't its raw core count, but its blend of core counts and frequency. Not every workload scales indefinitely or particularly well past a certain point. 18-core and 28-core CPUs are incredibly useful in the right circumstances, but their general utility suffers as their core counts rise. This 14-core chip is clearly positioned at the bleeding edge of what Intel feels is a balance between speed and raw threads, and Puget Systems bought one of the chips at auction to [put it through its paces](#).

Puget's overall conclusion on the chip is nuanced and application-specific. Whether or not it's the right core for you will depend significantly on whether or not you have a small fortune to buy one and exactly how much you need every last ounce of performance, power consumption be damned.

Puget's overall conclusion is much as you might expect, based on the specifics of the CPU. Is it incredibly fast? Yes. Does it cleanly justify its purchase price in any specific application? The answer there is a carefully worded "Well, you've got to really have a need for speed."

Overall, we'd say Intel hit its goal in terms of offering a CPU that can push past even the mighty Core i9-9990K in both frequency and core count tests. But given that we literally can't even give you a price quote on the chip, the old adage "If you have to ask how much it costs, you can't afford it," has never seemed truer. The vast majority of performance-hungry enthusiasts will be better off with another option, even as we acknowledge that the Core i9-9990XE offers the best performance for certain classes of work.



## Apple to Raise Barrier Against VR, AR Websites

The next upgrade of Apple's mobile operating system, iOS 12.2, will come with an annoying surprise for virtual and augmented reality developers.

It will block Web access to the accelerometer and gyroscope in Apple mobile devices by default, Digiday reported Monday.

That means users will have to grant permission to any Web apps or sites that need those components to function, including those with virtual reality and augmented reality components.

Apple's move is designed to protect the privacy of its customers by giving them control over who has access to their location data.

"If you're a developer of AR or VR mobile experiences, this is going to be something that impacts you," said Michael Goodman, director for digital media in the Newton, Massachusetts offices of [StrategyAnalytics](#), a research, advisory and analytics firm.

"Any time you put in an additional set-force a consumer to do something as opposed to it happening automatically - that's a roadblock that's going to affect developers of AR and VR experiences," he told TechNews World. "It means they're going to have a smaller audience, because their app doesn't work out of the box anymore."

If a user is purposefully using an AR Web-based application, then the individual would likely have enabled this feature from the start, or the application could notify and prompt the user to enable it -- much like we have today with permissions on phones," Inouye observed.

