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Science Service

Vol 37 No. 06 (22 pages including cover)

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TATA TRUSTS PARTNERS WITH TELANGANA TO UPGRADE CANCER CARE

The Telangana government and Tata Trusts today signed an MoU to deliver high quality affordable cancer care through a three-tier model and develop academic and research capabilities in the state.

According to a statement issued by Tata Trusts, the MoU was signed by A Santhi Kumari, Telangana Principal Secretary, Health, Medical and Family Welfare Department, and R Venkataraman, Managing Trustee, Tata Trusts.

As part of the agreement, two apex super-speciality hospitals in the city – the MNJ Institute of Technology and the Nizam Institute of Medical Sciences – will be upgraded to handle complex cancer cases on a referral basis.

Medical colleges in Adilabad, Nizamabad, Mahbubnagar and Warangal will be strengthened to offer diagnosis and treatment of cancer cases, the release said.

District hospitals in Karimnagar, Khammam and Nalgonda will be developed to offer diagnostic and standardised day care chemotherapy, it said.

These measures will create a state-wide cancer care network to take treatment closest to patients by improving the existing public health system and infrastructure, the release added.

Telangana Minister for Information Technology K T Rama Rao, Minister for Health, Medical Education and Family Welfare C Laxma Reddy, and Tata Trusts Chairman Ratan Tata were present on the occasion.

Ratan Tata, said, “We are privileged to partner with the Government of Telangana in upgrading cancer care capabilities in the public health network. Patients will no longer need to travel all the way to Hyderabad except for rare and complex conditions.”

The initiative in Telangana is the latest in Tata Trusts effort to partner with state governments and other entities to decentralise cancer care in India.

Similar initiatives are in different stages of implementation in Assam, Maharashtra and Uttar Pradesh, the release said.

IMPROVE GENDER DISPARITY IN SCIENCE, TECH: VARDHAN TO SCIENTIFIC COMMUNITY

Science and Technology Minister Harsh Vardhan today urged the scientific fraternity to correct the under-representation of women in areas of science and technology.

He was addressing a national conference on ‘Technological Empowerment of Women’ to commemorate the International Women’s Day here.

Vardhan said steps must be taken to expand funding to research in science and technology by women scientists as the

amount of funding at higher levels was less.

“Women are not just home-builders, but nation-builders,” he said.

The minister said that science and technology were still considered to be the domain of men. He emphasised that women empowerment was the key focus of his government and outlined various schemes and initiatives for their empowerment.

Vardhan also released a report titled ‘Women in Science: A listening Session’ besides distributing national awards to women scientists in the senior and young category on the occasion.

Agricultural scientist M S Swaminathan, nuclear scientist Anil Kakodkar and DST Secretary Ashutosh Sharma also addressed the gathering.

ENCOURAGE WOMEN PARTICIPATION IN FIELD OF SCIENCE: PRESIDENT

President Ram Nath Kovind today called for encouraging participation of women in science in every way possible, saying if gender disparity was not addressed, scientific achievements would be “less than perfect and less than desirable”.

Addressing the directors of IISc, IITs and IISERs in the concluding session of the meet, the president said the country was facing enormous challenges like ensuring people’s health and well-being, lifting them out of poverty, or attaining food and energy security.

These institutes could play an important role, he said and suggested that the incubation centres could also help develop solutions to the problems experienced on a daily basis — from pollution of natural resources to the traffic jams in rapidly expanding cities.

He stressed on collaboration between these institutes and said they should share ideas and pool resources. “Such a synergy would help you to better address some of the problems we face,” he said.

The president said there is a need for promotion of the participation of girl students and of women in science and technology.

“If this disparity is not addressed, our scientific achievements will always be less than perfect and less than desirable. Two days from now, we shall be celebrating the International Women’s Day. Let us re-dedicate ourselves to ensuring a higher participation of women in science,” he said.

He said he was delighted to know that the Indian Institute of Technology was taking steps to improve gender ratio in enrolment for its B.Tech programmes and had set a goal of ensuring that by year 2020, 20 per cent of such students were women.

“This is huge task given that presently less than 10 per cent of B.Tech students in IITs are women. We must remember

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that none of our developmental goals have any meaning without gender parity and without equal opportunities for our daughters and girl-children,” he said.

The president said these institutes of national importance had an important responsibility to ensure that research and developments in science and technology were linked to the needs of the country and its people.

“At the heart of a scientific endeavour is often a problem that the scientist wants to solve. It is important that challenges that confront our nation and our society become the prime instigator of their quest for knowledge, discovery and innovation,” he said.

The president called upon the directors of 31 IISc, IITs and IISERs to discharge their key role as leadership mentors for the next generation of scientists.

“This would ensure that we have a ready talent pool of scientist-administrators who can conceive, establish and administer our scientific institutes,” he said.

Among those who participated in the one-day meet were HRD Minister Prakash Javadekar, Minister of State for HRD Satya Pal Singh, AICTE Chairman Anil D Sahasrabudhe, representatives of HRD Ministry, Finance Ministry and Department of Science and Technology.

BJP DISCREDITING REAL ACHIEVEMENTS OF INDIAN SCIENCE: THAROOR

Stressing that plastic surgery had indeed been invented in India, senior Congress leader Shashi Tharoor today hit out at the BJP for “discrediting” the real achievements of ancient Indian science through “preposterous” claims by its leaders.

Speaking at an event organised by the All India Professionals’ Congress, he also said Ramayana and Mahabharata should be taught in schools in the cultural context and not as a sacred text.

In a direct reference to junior HRD Minister Satya Pal Singh’s comment against Darwinism, Tharoor said it was “absurd” that the BJP leader said “no one saw an ape turn into a man”.

“The process of evolution takes millions of years and no one lives long enough to see an ape turn into a man. He (Singh) has not realised,” he added.

The Thiruvananthapuram MP also trained his guns on Prime Minister Narendra Modi over the latter’s “Ganesha’s head” comment.

“You can read my article, ‘India’s War on Science’, on the internet. Actually, it is Modi’s war on science because he did say that Ganesha’s head on a human body showed that we had plastic surgery (in ancient India),” he said.

Asserting that India was indeed the country where plastic surgery was invented, Tharoor said, “By saying these

preposterous things, the BJP elements are discrediting the real achievements of Indian science, because you know what, India was the country that had invented plastic surgery.

“India had the first known surgeon in history — Shushruta. The first known surgical instruments found in archaeology were Indian instruments of the First AD. There is textual evidence of the first plastic surgery operation — rhinoplasty — the surgery of nose.”

The people of the country should be proud of such real achievements such as the findings of Aryabhata, but there was not enough material on these in the textbooks, he added.

“These are the things we can be proud of. Instead, you talk about the Ganesha’s head and the entire credibility of your history passes,” the Congress leader said.

Talking about Aryabhata, he said the great mathematician-astronomer had anticipated the findings of Galileo, Kepler and Copernicus in Europe and that Rigveda had a pretty accurate description of gravity.

“But we do not not know enough about these real achievements and it is partly our fault, because all we are talking about is the Pushpak Viman jetting around the world,” Tharoor added.

He also said Ramayana and Mahabharata should be taught in schools the way Odyssey and Iliad are taught in the Western world.

“I do believe that we should be teaching the Ramayana and the Mahabharata, but not as sacred texts, but as rich cultural stories, in the syllabus,” Tharoor said, adding that these stories should come into a framework of reference, so that people understood the characters of these epics in a socio-cultural context.

SCIENTISTS DISCOVER ANTIBIOTIC-PRODUCING BACTERIUM

A novel species of a bacterium that produces antibiotic has been discovered by a professor in the University of Hyderabad (UoH) and his researchers, the university said today.

“Found in the Buffalo Lake on the UoH campus, the newly discovered bacterium, *Planctopirus hydrillae*, may provide a solution to the problem of diseases becoming resistant to a majority of known drugs,” UoH said in a release.

The new bacteria would also clean up ammonia waste, a growing environmental concern, it said.

The bacterium was discovered by Venkata Ramana, Professor and Head, Department of Plant Sciences, School of Life Sciences, UoH and his researchers, it said.

Scientists have been striving hard to find drugs to overcome the challenge of antimicrobial resistance in the wake of disease-causing germs failing to respond to even the most potent antibiotics, it said.

“In this scenario, the discovery of antibiotic-producing

Planctomycete may help in the development of a new drug. The bacterium was isolated from aquatic plant Hydrilla,” the release said.

The discovery was published in the latest issue of the scientific publication, Journal of Antibiotics, it said.

“The new species reported by the researchers is a very uncommon bacterium belonging to the phylum Planctomycetes and was isolated from the university campus,” Ramana said.

“This is the first report of an antibiotic producing bacterium from the phylum Planctomycetes. Cultivating the bacteria of this phylum is extremely difficult.

And we are the first group from India to develop the art of cultivating these bacteria which are very useful even for environmental issues particularly for the treatment of ammonia waste,” he said.

The bacteria are called as “Anamox (Anaerobic ammonia oxidising) bacteria,” Ramana said.

The senior professor said he and his team have been working to identify the chemical nature of the antibiotic and the spectrum of antibiotic.

“They have also sequenced the genome of the bacterium,” the release said.

The team included researchers from Bacterial Discovery Laboratory, Centre for Environment, Institute of Science and Technology, JNTU (Jawaharlal Nehru Technological University), Hyderabad and UoH, it added.

OVER 17,000 CORNEAL TRANSPLANTS DONE AT AIIMS TILL DATE: TITIYAL

Over 17,000 corneal transplant surgeries have been conducted at the AIIMS till date, out of which 1,285 were done last year, Chairman of the National Eye Bank Jeewan S Titiyal said today.

He was addressing a press conference at the Dr Rajendra Prasad Centre for Ophthalmic Sciences at the All India Institute of Medical Sciences here, to mark the foundation day of the centre.

The eye bank is situated in the over 50-year-old centre is housed in the AIIMS campus, and various programmes have been lined up to commemorate the occasion.

“We (AIIMS) have conducted 17,000-18,000 corneal transplant surgeries till date. Last year, we had corneas from 1,844 donors, out of which 1,285 were used for surgeries,” Titiyal said.

The senior doctor said about 27,000 corneas were collected altogether but not all are used for various reasons.

“After an eye is donated, only then we go for testing. And, if it found to be unhealthy or carrying infection, then we don't use it,” he added.

The press conference was also addressed by the centre's Chief and Professor of Ophthalmology Atul Kumar, and various

other senior doctors of the centre.

“We first train our young doctors on goat's eyes and then they perform simple surgeries in the presence of senior doctors before they graduate to a level of expertise,” Kumar said.

A senior doctor spoke about the ‘vision centres’ set up in Delhi and neighbouring cities, where doctors from AIIMS go and conduct examinations of eye patients.

“There were 15 such centres two years ago, and now we have about 25 of them. We tie up with local dispensaries and keep our set up there, and doctors from AIIMS pay regular visit, so patients need not come to the AIIMS,” he said.

Kumar said, only those patients who need surgery are sent to the Dr Rajendra Prasad Centre for Ophthalmic Sciences, and “we conduct all eye-related surgeries free of cost... It is to help poor and needy people.”

On the National Blindness Survey (2015-2018), the senior doctor said, “27 of the 30 districts have been covered. 3,000 people are being sampled per district. It is expected to be completed by June. By the end of which, we will get to know the level of partial blindness and blindness in the country.”

DENSELY POPULATED CITIES SUSTAIN URBAN PLANNING BETTER: CSE

The executive director of Centre for Science and Environment, Anumita Roychowdhury, has said “high-density cities can sustain urban planning better than the newly built ones”.

Speaking at a programme - Green cities mission: a dialogue on urban sustainability - Roychowdhury said yesterday the web of interconnected lanes in the densely populated cities makes travelling faster.

“People can walk short distances in the high-density cities. In a new place like Newtown, where the planners have built rows of super blocks at the nodes and there is no maze of lanes, vehicle is the only option for travelling,” she explained.

That in a way also gives rise to vehicular pollution, Roychowdhury said.

“The builders often do not take climatic factors into consideration. It is necessary to monitor energy performances of green-rated buildings and modify the bylaws of urban planning bodies.”

Asked about the situation in West Bengal, she said, “While the state government is formulating new policies and announcing incentive programmes for green buildings, we have to find out if we are implementing the ideas in a proper manner,” the top CSE official said.

West Bengal Pollution Control Board Chairman Kalyan Rudra said initiatives have been taken for solid waste management and recycling.

“Years ago, a popular resort/open air theatre had come up on the top of a waste dump which looked like a hilltop along

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E M Bypass. I think using waste materials for such purposes is not feasible. Instead we should look towards recycling or reusing waste,” he said.

The takeaway points from the of the one-day meet - organised by the CSE Delhi and Institute of Town Planners - will be forwarded to the Urban Development Ministry and Environment Ministry for a “possible follow-up action”, Roychowdhury added.

IIT Kharagpur Professor Somnath Sen, IEST Professor Souvannic Roy, Technical Advisor of Kolkata Municipal Corporation N B Basu were among those who participated in yesterdays programme.

HAWKING’S INDIAN STUDENT REMEMBERS COSMOLOGY’S BRIGHTEST STAR

Physically bound to the wheelchair, Stephen Hawking reached out into the depths of the universe with his mind and decoded the mysterious cosmos for the common people - that is how the British physicist was remembered by his Indian student today.

When you think about human spirit, you think about Stephen Hawking, said astrophysicist Somak Raychaudhury, director of the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune, who was a student of Hawking at University of Cambridge.

The famous physicist Stephen Hawking - modern cosmology’s brightest star - passed away today at the age of 76.

Known for his ground breaking work with black holes and relativity, Hawking was a household name for his resilient spirit to explore the expanse of the universe despite being confined to the wheel chair.

“He was my teacher, and I knew him from a time when he could speak. Personally it’s a huge loss. Hawking is special because he is larger than life,” Raychaudhury told PTI.

“The man in the street knows Hawking’s name not because of his research on blackholes - the common person may not understand what Hawking did on blackholes,” said Raychaudhury, who obtained a PhD in astrophysics from Cambridge.

“They know him because he was a brain in a bottle, he could hardly move, and yet in spite of being given two years to live at the age of 20, he lived till 76 and tackled head on every obstacle in life,” he said

“That is the human spirit - you think about human spirit and you think about Stephen Hawking,” he added.

Hawking suffered from ALS (amyotrophic lateral sclerosis), a neurodegenerative disease commonly known as Lou Gehrig’s Disease, which is usually fatal within a few years.

He was diagnosed in 1963, when he was 21, and doctors initially only gave him a few years to live.

However, he went on to study at Cambridge and became one of the most brilliant theoretical physicists since Albert Einstein.

The disease left Hawking wheelchair-bound and paralysed. He was able to move only a few fingers on one hand and was completely dependent on others or on technology for virtually everything — bathing, dressing, eating, even speech.

Known for his unique way of speaking while living his life in a wheelchair, Hawking became an emblem of human determination and curiosity.

“In spite of his affliction, he carried on popularising science through his books and lectures,” said Raychaudhury.

“Any one who was confined to the wheelchair and was also given two years to live at the age of twenty would not take on the world in all these spheres,” he said.

From denying the existence of god, to asserting his belief in the existence of alien life, Hawking did not shy away from expressing his opinions on various things.

He continued to be in news for his controversial statements on the impending doom of mankind and his distrust of the ever-developing artificial intelligence systems.

His book ‘A Brief History of Time’ was what brought his science to the common people and rocketed Hawking to stardom.

Published for the first time in 1988, the title made the Guinness Book of Records after it stayed on the Sunday Times bestsellers list for an unprecedented 237 weeks.

It sold 10 million copies and was translated into 40 different languages.

“I attended the set of lectures that became the record breaking book “A Brief History of Time.” It was given in a set of public lectures during my first year in Cambridge,” said Raychaudhury.

“Even at the time, listening to those lectures every week one knew that this was something happening. He was explaining basics of cosmology in a way people hadn’t done before,” he said.

“It certainly the biggest science of the common people written in the last century. That turned so many people on to physics, cosmology and astrophysics,” he said.

MOON FORMED FROM DONUT-SHAPED CLOUD OF VAPOURISED ROCK: STUDY

The Moon may have emerged from a massive, donut-shaped cloud of a vapourised rock called synestia, rather than being spun out of the aftermath of a collision, a study suggests.

“The commonly accepted theory as to how the Moon was formed is that a Mars sized body collided with the proto-Earth and spun material into orbit,” said Simon Lock, a graduate student at Harvard University in the US.

“That mass settled into a disk and later accreted to form the Moon. The body that was left after the impact was the Earth. This has been the canonical model for about 20 years,” said Lock, co-author of the study published in *Journal of Geophysical Research: Planets*.

According to Lock, it is a compelling story but is probably not correct.

“Getting enough mass into orbit in the canonical scenario is actually very difficult, and there is a very narrow range of collisions that might be able to do it,” he said.

Tests have shown that the isotopic “fingerprint” for both the Earth and Moon are nearly identical, suggesting both came from the same source.

However, in the canonical story, the Moon formed mostly from the remnants of just one of the two bodies that collided.

Tests have shown that the Moon is far less abundant in many volatile elements - such as potassium, sodium and copper - that are relatively common on Earth.

The scenario outlined by Lock and colleagues still begins with a massive collision, but rather than creating a disc of rocky material, the impact creates a vapourised rock called synestia.

“It is huge. It can be ten times the size of the Earth, and because there is so much energy in the collision, maybe 10 per cent of the rock of Earth is vapourised, and the rest is liquid...so the way you form the Moon out of a synestia is very different,” Lock said.

It begins with a “seed” - a small amount of liquid rock that gathers just off the centre of the donut-like structure. As the structure cools, vapourised rock condenses and rains down towards the centre of the synestia. Some of the rain runs into the Moon, causing it to grow.

“The rate of rain fall is about ten times that of a hurricane on Earth,” Lock said.

“Over time, the whole structure shrinks, and the Moon emerges from the vapour. Eventually, the whole synestia condenses and what’s left is a ball of spinning liquid rock that eventually forms the Earth as we know it today,” said Lock.

The whole process happens remarkably fast, with the Moon emerging from the synestia in just a few tens of years, and

the Earth forming about 1,000 years later, he said.

“This new work explains features of the Moon that are hard to resolve with current ideas,” said Sarah Stewart, a professor at University of California, Davis in the US.

“This is the first model that can match the pattern of the Moon’s composition,” said Stewart.

CURIOSITY ROVER TESTS NEW WAY TO DRILL ON MARS: NASA

NASA’s Mars Curiosity rover has conducted the first test of a new drilling technique on the red planet since its drill stopped working reliably, the US space agency said.

This early test produced a hole about one centimetre deep at a target called Lake Orcadie - not enough for a full scientific sample, but enough to validate that the new method works mechanically, according to NASA.

This was just the first in what will be a series of tests to determine how well the new drill method can collect samples, it said.

“We are now drilling on Mars more like the way you do at home,” said Steven Lee, deputy project manager at NASA’s Jet Propulsion Laboratory in California.

“Humans are pretty good at re-centring the drill, almost without thinking about it. Programming Curiosity to do this by itself was challenging - especially when it was not designed to do that,” said Lee.

The drill is used for pulverising rock samples into powder, which are then deposited into two of Curiosity’s laboratory instruments, Sample Analysis at Mars, or SAM, and Chemistry and Mineralogy, or CheMin.

Curiosity has used its drill to collect samples 15 times since landing in 2012.

However, in December 2016, a key part of the drill stopped working.

The drill was designed to use two finger-like stabilisers to steady itself against rock; a faulty motor prevented the drill bit from extending and retracting between these stabilisers.

After months of effort, Curiosity’s engineering team was able to extend the drill all the way out past the stabilisers, but the motor issue persisted.

The team wanted to see if it could hack the space robot’s drill so that it did not require stabilisers.

Images of a new hole on upper Vera Rubin Ridge, Curiosity’s current location, suggest this “MacGyvering” is paying off.

By leaving the drill in an extended position, engineers were able to practice this freehand drilling for months during testing here on Earth.

This hole at Lake Orcadie provides the first insights into how this operation will work in the martian environment.

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If the previous method was like a drill press, holding the bit steady as it extends into a surface, it is now more freehand, NASA said.

The rover is using its entire arm to push the drill forward, re-centring itself while taking measurements with a force sensor.

That sensor was originally included to stop the rover's arm if it received a high-force jolt. It now offers Curiosity a vital sense of touch, preventing the drill bit from drifting sideways too much and getting stuck in rock.

'SEARCH FOR FIRST STARS UNCOVERS DARK MATTER'

Astronomers claim to have found the first direct proof of the existence of the mysterious dark matter - one of the building blocks of the cosmos - while attempting to detect the earliest stars in the universe.

The study led by Professor Judd Bowman from Arizona State University in the US suggests that the signal is proof of interactions between normal matter and dark matter in the early universe.

The discovery, published in the journal Nature, offers the first direct proof that dark matter exists and that it is composed of low-mass particles.

The signal, recorded by a novel radio telescope called EDGES, dates to 180 million years after the Big Bang.

"Dark matter is the key to unlocking the mystery of what the universe is made of," said Professor Rennan Barkana from Tel Aviv University in Israel.

"We know quite a bit about the chemical elements that make up the Earth, the Sun and other stars, but most of the matter in the universe is invisible and known as dark matter," Barkana said.

"The existence of dark matter is inferred from its strong gravity, but we have no idea what kind of substance it is. Hence, dark matter remains one of the greatest mysteries in physics," said Barkana.

"To solve it, we must travel back in time. Astronomers can see back in time, since it takes light time to reach us. We see the Sun as it was eight minutes ago, while the immensely distant first stars in the universe appear to us on Earth as they were billions of years in the past," Barkana said.

Bowman and colleagues reported the detection of a radio wave signal at a frequency of 78 megahertz.

The width of the observed profile is largely consistent with expectations, however they also found it had a larger amplitude (corresponding to deeper absorption) than predicted, indicating that the primordial gas was colder than expected.

Barkana suggests that the gas cooled through the interaction of hydrogen with cold, dark matter.

"I realised that this surprising signal indicates the presence of two actors: the first stars, and dark matter," said Barkana.

"The first stars in the universe turned on the radio signal, while the dark matter collided with the ordinary matter and cooled it down. Extra-cold material naturally explains the strong radio signal," said Barkana.

SMARTPHONE TECH MOST DAMAGING TO ENVIROMENT: STUDY

Smartphones and data centres will be the most damaging information and communications technologies to the environment by 2040, a study has found.

Researchers from the McMaster University in Canada studied the carbon footprint of consumer devices such as smartphones, laptops, tablets, desktops as well as data centres and communication networks as early as 2005.

Not only did they discover that software is driving the consumption of information and communications technology (ICT), they also found that ICT has a greater impact on emissions than we thought and most emissions come from production and operation.

"We found that the ICT industry as a whole was growing but it was incremental," said Lotfi Belkhir, associate professor at McMaster.

"Today it sits at about 1.5 per cent. If trends continue, ICT will account for as much as 14 per cent for the total global footprint by 2040, or about half of the entire transportation sector worldwide," Belkhir said.

"For every text message, for every phone call, every video you upload or download, there's a data centre making this happen," he said.

"Telecommunications networks and data centres consume a lot of energy to serve you and most data centres continue to be powered by electricity generated by fossil fuels. It's the energy consumption we don't see," he added.

The study, published in the Journal of Cleaner Production, suggest that by 2020, the most damaging devices to the environment are smartphones.

While smartphones consume little energy to operate, 85 per cent of their emissions impact comes from production.

A smartphone's chip and motherboard require the most amount of energy to produce as they are made up of precious metals that are mined at a high cost.

Smartphones also have a short life which drives further production of new models and an extraordinary amount of waste.

"Anyone can acquire a smartphone, and telecommunications companies make it easy for people to acquire a new one every two years," Belkhir said.

“We found that by 2020 the energy consumption of a smartphone is going to be more than that of PCs and laptops,” he added.

SELF-AWARE AI ‘CYBERSLUG’ MIMICS OCEAN PREDATORS

Scientists have built a self-aware, artificially intelligent (AI) Cyberslug - a virtual ocean predator that behaves a lot like the original flesh-and-blood organism which it mimics.

The virtual creature reacts to food and responds to members of its own kind much like the actual animal, the sea slug *Pleurobranchaea californica*, does.

Unlike most other AI entities, Cyberslug has a simple self-awareness, said Rhanor Gillette, professor at University of Illinois in the US.

“That is, it relates its motivation and memories to its perception of the external world, and it reacts to information on the basis of how that information makes it feel,” Gillette said.

Cyberslug knows when it is hungry, for example. It also has learned which other kinds of virtual sea slugs are yummy to eat and which are less desirable.

Sea slugs typically choose one of three responses when encountering another creature in the wild - to eat it, mate with it, or flee from it, Gillette said.

To make the right choice, they must be able sense their own internal state, get cues from their environment and remember past encounters.

“Their default response is avoidance, but hunger, sensation and learning together form their ‘appetitive state,’ and if that is high enough the sea slug will attack,” Gillette said.

“When *P californica* is super hungry, it will even attack a painful stimulus,” he said.

“When the animal is not hungry, it usually will avoid even an appetitive stimulus. This is a cost-benefit decision. Cyberslug behaves the same way,” he added.

The researchers had previously worked out the brain circuitry that allows sea slugs to operate in the wild, “down to individual neurons,” he said.

They had experimented with simple computer simulations. One of the first circuitry boards built to represent the sea slug brain was housed in a plastic foam food takeout container.

The model, described in the journal *eNeuro*, uses more sophisticated algorithms to simulate Cyberslug’s competing goals and decision-making, Gillette said. Over time it learns what is good and not so good to bite.

Just like *P californica*, the more it eats, the more satiated it becomes and the more likely it is to avoid other creatures. However, as hunger returns, Cyberslug becomes a less picky eater.

“I think the sea slug is a good model of the core ancient

circuitry that is still there in our brains that is supporting all the higher cognitive qualities,” Gillette said.

“Now we have a model that’s probably very much like the primitive ancestral brain. The next step is to add more circuitry to get enhanced sociality and cognition,” he said.

AI-BASED FLOATING HEAD TO ASSIST ISS ASTRONAUTS

A 3D-printed artificial intelligence system - described by its creators as a “flying brain” - will soon join the crew aboard the International Space Station (ISS) to assist astronauts.

Airbus, an aeronautics company based in Netherlands, is developing CIMON (Crew Interactive MOBILE Companion), an AI-based space assistant for Germany’s DLR Space Administration.

The technology demonstrator, which weighs around five kilogrammes, will be tested on the ISS by German astronaut Alexander Gerst during the European Space Agency’s Horizons mission between June and October this year.

“CIMON will be the first AI-based mission and flight assistance system,” said Manfred Jaumann, Head of Microgravity Payloads from Airbus.

“We are the first company in Europe to carry a free flyer, a kind of flying brain, to the ISS and to develop artificial intelligence for the crew on board the space station,” said Jaumann.

The entire structure of CIMON is made up of plastic and metal, created using 3D printing.

CIMON has a brain-like AI network and is designed to support astronauts in performing routine work, for example by displaying procedures or offering solutions to problems.

With its face, voice and artificial intelligence, becomes a genuine ‘colleague’ on board.

With CIMON, crew members can do more than just work through a schematic view of prescribed checklists and procedures; they can also engage with their assistant.

CIMON makes work easier for the astronauts when carrying out every day routine tasks, helps to increase efficiency, facilitates mission success and improves security, as it can also serve as an early warning system for technical problems.

The Watson AI was trained using voice samples and photos of Gerst, and procedures and plans of the Columbus module of the ISS were loaded into the database.

Gerst also helped select CIMON’s screen face and computer voice so that he could ‘make friends’ with his electronic colleague.

Once the functional testing of the system has been completed, Gerst and CIMON will experiment with crystals, work together to solve the Rubik’s cube and perform a complex medical experiment using CIMON as an ‘intelligent’ flying camera

in space.

In its first Space mission, CIMON will only be equipped with a selected range of capabilities.

In the medium term, aerospace researchers also plan to use the CIMON project to examine group effects that can develop over a long period of time in small teams and that may arise during long-term missions to the Moon or Mars.

Social interaction between people and machines, between astronauts and assistance systems equipped with emotional intelligence, could play an important role in the success of long-term missions.

Airbus' developers are convinced that, here on Earth, developments of the assistance system could also find future use in hospitals and social care.

CIMON will get its first 'taste of space' as early as March 2018: the 31st DLR parabolic flight campaign will focus in particular on testing and optimising GNC algorithms (Guidance, Navigation and Control) under zero gravity conditions.

NASA TECH LENDS EVERLASTING SHINE TO OSCAR TROPHIES

The coveted Oscar trophy is coated in the same gold that helps telescopes glimpse distant galaxies, ensuring that the hard-earned prize never loses its shine, according to NASA.

US-based Epner Technology, which has been working with NASA since the 1970s and improved its electroplating technique doing aerospace work in the 1990s, claims that its gold would never flake off.

In 2016, Epner's reputation for durable and brilliant gold coatings, earned it a new client - the Academy of Motion Picture Arts and Sciences.

For more than three decades, a trophy manufacturer had been casting the Oscars in a tin alloy and then plated them with gold. They shone, but the coating eventually wore off.

Epner uses an electroplating process it calls LaserGold. The resulting coating was already harder and more reflective than vapour-deposited gold, but both attributes have been further improved through the company's collaboration with NASA.

"We guaranteed that our gold coating will never come off," company president David Epner said.

Epner has offered a lifetime guarantee to replate, for free, any Oscar that starts to show wear.

Gold is useful in space, because it is good at reflecting infrared wavelengths of light, which help to detect celestial objects from very far away. It is also inert and does not tarnish.

The most common method for gold coating is by vapour deposit. The metal is heated in a vacuum until it becomes a gas, which then condenses in a thin layer across a surface.

The process is effective but has drawbacks. For one, the gold loses some of its reflectivity. It also becomes extremely

delicate.

The telescope's designers wanted a gold-plating method that would maintain the high reflectivity of solid gold and be extremely durable.

Epner Technology claimed its gold would never flake off and that their gold plating was significantly more reflective than vapour-deposited gold.

It has been using the improved technique for its varied commercial clients, from thermometers to infrared carbon dioxide detectors to jewellery from gold-plated lace.

THREE SUPER-EARTH EXOPLANETS DISCOVERED

Astronomers have discovered three super-Earth planets orbiting a star about 100 light-years away from our solar system.

The three exoplanets discovered by researchers at Harvard-Smithsonian Center for Astrophysics (CfA) in the US have radii of about 1.6, 1.3, and 2.1 Earth-radii respectively.

All of them are categorised as super-Earths, that is, with masses that are larger than Earth's but less than Neptune's.

The star named GJ9827 is one of the few known stars to have multiple transiting terrestrial-sized exoplanets that are suited for atmospheric characterisation.

"Its three exoplanets are particularly interesting because two of them have radii between 1.5 and 2.0 Earth-radii," said Joseph Rodriguez from CfA.

"Across this range in radii, the composition of planets is expected to change from rocky to gaseous; moreover, there are relatively few such candidates for study," said Rodriguez.

These planets orbit very close to the star, with periods of 1.2, 3.6 and 6.2 days respectively, and at these close distances they have fairly hot temperatures, estimated at 1,172, 811 and 680 degrees kelvin, researchers said.

Future observations will probe their atmospheres and provide a much more detailed picture of this unusual family of super-Earths, they said.

Over 3,500 extra-solar planets have been confirmed to date, according to the study published in *The Astronomical Journal*.

Most of them were discovered using the transit method, and astronomers can combine the transit light curves with velocity wobble observations to determine the planet's mass and radius, and thereby constrain its interior structure.

The atmosphere can also be studied in a transit by using the fact that the chemical composition of the atmosphere means its opacity varies with wavelength.

By measuring the depth of the transit at different wavelengths, it is possible to infer the composition and temperature of the planet's atmosphere.

MALE SPIDERS GIFT SILK-WRAPPED FOOD TO WOO MATES

Male hunting spiders wrap morsels of food in their silk and offer these as gifts to prospective mates, a study has found.

Unlike many other species, male hunting spiders do not use chemical signals such as sex pheromones to attract a mate. Instead, they make their mark by uniquely exploiting a female hunting spider's interest in food, researchers said.

Researchers from Ludwig Maximilian University in Munich in Germany conducted a series of experiments on around 100 spiders (*Pisaura mirabilis*) to test whether the silk that male and female hunting spiders produce is an important part of mating, and if sex pheromones are always released.

The study, journal *Behavioural Ecology and Sociobiology*, showed that male and female spiders do not have the same reaction to silk. Males were attracted to the draglines that females produced.

According to the researchers, this suggests that there are chemical cues attached to these silk draglines, and these likely serve as a form of female advertisement.

Signalling through draglines may also be a way for females to supplement their own efforts to find food, because it lures would-be gift-carrying mates.

Many previous studies have examined the role that sex-specific pheromones or semiochemicals play in the evolution of a spider's reproduction cycle.

Pheromones can be emitted both from a spider's body and from its silk. This form of chemical messaging allows for long-distance air-borne, or direct communication between spiders, and enables them to locate a mate, distinguish between males and females, or decide on the suitability of a potential partner.

Among web-building species, females living on webs rely on their pheromones to be carried through the air so that potential males can determine their whereabouts and learn more about their sexual maturity and mating status.

Webless wandering species such as the hunting spider (*Pisaura mirabilis*) often depend on so-called draglines which hang, for example, from branches.

These draglines are important not only for movement, but as part of the process of searching and attracting mates.

Males also use their silk in another way: they are among only a few species that offer nuptial gifts of prey wrapped in dense layers of silk to females, to be eaten during copulation.

The researchers found that females had no interest in the draglines that males produced, nor the silk that they used to wrap nuptial gifts in. This suggests that male hunting spiders do not release chemical signals.

"This suggests that males rather may be uniquely exploiting females' interest in food through their gift-giving behaviour," said Michelle Beyer, from Ludwig Maximilians University of Munich.

According to Beyer, females might also have learnt to ignore chemical signals, because males deceive them about the quality of the food hidden in the silk-wrapped gifts presented to them.

NOVEL ANTIBODY SUPPRESSES HIV IN MONKEYS: STUDY

An experimental HIV antibody has successfully suppressed the deadly virus for six months without additional treatment, a trial in monkeys has found.

The therapy may have targeted the viral reservoir - populations of long-lived, latently infected cells that harbour the virus and that lead to resurgent viral replication when suppressive therapy is discontinued.

The findings may inform strategies that attempt to achieve sustained, drug-free viral remission in people living with HIV.

After receiving a course of antiretroviral therapy for their HIV-like infection, about half of a group of monkeys infused with a broadly neutralising antibody to HIV combined with an immune stimulatory compound suppressed the virus for six months without additional treatment.

"HIV excels at evading the immune system by hiding out in certain immune cells. The virus can be suppressed to very low levels with antiretroviral therapy, but quickly rebounds to high levels if a person stops taking medications as prescribed," said Anthony S Fauci, Director the US National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health.

"The findings from this early stage research offer further evidence that achieving sustained viral remission without daily medication might be possible," Fauci said.

"This potential application is yet another example of how the research community is using powerful, broadly neutralising antibodies in multiple experimental applications to protect against and treat HIV," he said.

In the study, scientists from Beth Israel Deaconess Medical Center (BIDMC) led by Dan Barouch, first infected 44 rhesus macaques with simian human immunodeficiency virus (SHIV), an HIV-like virus commonly used in nonhuman primate studies.

They then initiated daily antiretroviral therapy (ART) during acute infection to suppress the virus to below detectable levels in the monkey's blood.

After 96 weeks of continuous ART, researchers divided the monkeys into four equal groups: a group that received five

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infusions of the HIV bNAb known as PGT121; a group that received ten administrations of GS-9620, an immune stimulant under development at Gilead Sciences; a group that received both therapies; and a control group that received neither.

Researchers continued to administer ART throughout this period and afterward for 16 additional weeks. Antibody levels were undetectable for at least eight weeks prior to discontinuation of ART.

The experiment was designed to determine whether this combination of antibody and immune stimulant could reduce the viral reservoir while virus replication was well controlled by ART.

After discontinuation of ART, virus rebounded in the blood of all 11 of 11 control monkeys after a median of 21 days.

By contrast, six of 11 monkeys that received the combination of PGT121 and GS-9620 showed a delayed viral rebound after a median of 112 days, and five of 11 animals in the combination group did not rebound for at least 168 days after discontinuing ART.

The animals in the combination group that did rebound demonstrated viral loads that were more than 100-fold lower than the control group.

The monkeys treated with the combination also had markedly less viral DNA in their lymph nodes, suggesting that the reservoir was reduced but not eliminated.

The addition of GS-9620 appeared to extend both the length of viral suppression and the magnitude of reduction in the viral reservoir.

“Our findings suggest that the development of interventions to activate and eliminate a fraction of the viral reservoir might be possible,” said Barouch.

“Although we are still a long way off from having a cure for HIV, our data suggest a strategy for targeting the viral reservoir that can be further explored,” he said.

NEW SYSTEM CAN TEACH COMPUTERS TO LEARN LIKE HUMANS

Scientists are developing a novel platform for artificial intelligence (AI) that can teach computers to learn from experience like humans do.

“Cognitive learning is all about teaching computers to learn without having to explicitly programme them,” said Paul Rad from the University of Texas at San Antonio (UTSA) in the US.

“In this study, we are presenting an entirely new platform for machine learning to teach computers to learn the way we do,” said Rad.

To build the cloud-based platform, researchers studied how education and understanding has evolved over the past five centuries.

They wanted to gain a better picture of how computers could be taught to approach deductive reasoning.

“Our goal here is to teach the machine to become smarter, so that it can help us. That is what they are here to do. So how do we become better? We learn from experience,” Rad said

The researchers also studied how humans learn across their lifetimes.

Children, for example, begin by identifying objects such as faces and toys, then move on from there to understand communication. This process helps their thought processes mature as they get older.

The researchers want AI agents to learn automatic threat detection.

This means the AI agent can dynamically learn network traffic patterns and normal behaviour and thus become more effective in discovering and thwarting new attacks before significant damage.

“Or it would be nice if an intelligent computer assistant could aggregate thousands of news items or memos for someone, so that the process of reading that material was quicker and that person could decide almost instantly how to use it,” Rad said.

Additionally, intelligent machines could be used in medical diagnoses, which Rad says could lead to more affordable health care, and other fields that require precise, deductive reasoning.

NOTHING EXISTED BEFORE BIG BANG: STEPHEN HAWKING

There was absolutely nothing before the Big Bang, according to British physicist Stephen Hawking, who explained what happened prior to the existence of our universe.

The Big Bang theory proposes that a tiny speck of matter and energy began to grow, bringing about the birth of our universe about the universe billions of years ago.

However, scientists are intrigued by what was there before the “explosion” when there was supposed to be nothing.

“There was nothing around before the Big, Big Bang,” Hawking said.

His theory is based on the assumption that the universe has no boundaries.

“The boundary condition of the universe ... is that it has no boundary,” Hawking told physicist Neil deGrasse Tyson at the “Star Talk” show aired on National Geographic Channel.

The Big Bang theory holds that the universe in retrospective can shrink to the size of an extremely small “subatomic ball” known as the singularity.

According to Hawking, the laws of physics and time cease to function inside that tiny particle of heat and energy.

The ordinary real time as we know now shrinks infinitely

as the universe becomes ever smaller but never reaches a definable starting point.

Hawking argued that before the Big Bang real ordinary time was replaced by imaginary time and was in a bent form, state run news agency Xinhua reported.

“It was always reaching closer to nothing but didn’t become nothing,” said Hawking.

To help people better understand the abstract and confusing state, the physicist drew an analogy between the distorted time with Ancient Greek philosopher Euclid’s theory of space-time, a closed surface without end.

“One can regard imaginary and real time beginning at the South Pole. There is nothing south of the South Pole, so there was nothing around before the Big Bang,” Hawking said.

“There was never a Big Bang that produced something from nothing. It just seemed that way from mankind’s perspective,” Hawking said.

He said that a lot of what we believe is derived from a human-centric perspective, which might limit the scope of human knowledge of the world.

MILLENNIALS NOT SAVING ENOUGH FOR RETIREMENT: STUDY

Millennials are not saving enough for their retirement, a study has found, suggesting that they are in need of better financial education.

According to the US Census, millennials accounted for more than 25 per cent of the population in 2015, yet this significant segment of the workforce might not be prepared for retirement.

Researchers from the University of Missouri in the US found that only 37.2 per cent of working millennials have retirement accounts, demonstrating a need for increased financial education for retirement.

The study, published in the Family and Consumer Sciences Research Journal, is among the first to examine the state of millennials’ retirement savings.

“While it could be assumed that millennials have plenty of time to save for retirement, they have to shoulder more responsibility than their parents and grandparents to do so,” said Rui Yao, associate professor at University of Missouri.

“Compared to older generations, millennials are less likely to have employer-provided pension or defined benefit retirement plans. Additionally, millennials are likely to live longer,” said Yao.

Researchers used the most recent 2013 survey of consumer finances to determine the saving behaviours of millennials.

The research team was interested in the saving behaviours of millennials with at least one year of employment, making them eligible to contribute to a defined-contribution plan.

They found that only 37.2 per cent of respondents had a retirement account.

Comparing respondents with same income and wealth, retirement account balances were 52.9 per cent lower for black respondents than white respondents.

Advanced degree holders were more likely to have a retirement account compared to those with a high school diploma or below. However, the advanced degree holders saved a smaller amount.

Among self-employed individuals, only 17.6 per cent had a retirement account of any kind.

The researchers controlled for wealth and debt while analysing saving behaviours.

“The results suggest that financial education about saving for retirement is absolutely necessary,” Yao said.

“With the decline of defined benefit plans, millennials need to know much more about investing for retirement than their parents or grandparents did,” he said.

“Proper retirement preparation requires strategic and disciplined savings. Given that retirement accounts require the amount to compound, opening a retirement account early in one’s career is the best first step for effectively saving for retirement,” he added.

NEW SYSTEM LETS BLIND PLAYERS ENJOY POPULAR RACING VIDEO GAMES

Scientists have developed a new audio based system that makes existing racing video games accessible to visually impaired people, allowing them to get the same experience as sighted players.

The audio-based interface, which a player can listen to using a standard pair of headphones, can be integrated by developers into almost any racing video game, making a popular genre of games equally accessible to people who are blind.

“The racing auditory display (RAD) is the first system to make it possible for people who are blind to play a ‘real’ 3D racing game - with full 3D graphics, realistic vehicle physics, complex racetracks, and a standard PlayStation 4 controller,” said Brian A Smith, a PhD candidate at Columbia University in the US.

“It’s not a dumbed-down version of a racing game tailored specifically to people who are blind,” said Smith.

While there are a number of games on the market suitable for the blind, many are loaded with competing sources of information that players must sift through, slowing down the fun of playing the game.

Others are versions of popular games so simplified that a blind gamer does nothing more than follow orders.

There has been a fundamental tradeoff between preserving a game’s full complexity and its pace when making it blind-accessible.

“Our challenge was to give visually impaired players enough information about the game so that they could have the same sense of control and thrill that sighted players have, but not so much information that they would get overwhelmed by audio overload or bogged down in just figuring out how to interpret the sounds,” Smith said.

The RAD comprises two novel sonification techniques: a sound slider for understanding a car’s speed and trajectory on a racetrack, and a turn indicator system for alerting players about upcoming turns well in advance of the actual turns.

These approaches enable players to understand aspects about the race and perform a wide variety of actions in a way that is not possible in current blind-accessible racing games.

The aim was to design an interface that would give players enough relevant information to form a plan of action.

The RAD’s sound slider and turn indicator system work together to help players know the car’s current speed; align the car with the track’s heading; learn the track’s layout; profile the direction, sharpness, timing, and length of upcoming turns; cut corners; choose an early or late apex; position the car for optimal turning paths; and know when to brake to complete a turn.

Smith designed the RAD and then built a prototype car racing game in Unity, the most popular game engines in the world, and integrated the RAD into that prototype.

He ran two studies with 15 participants he recruited through the Brooklyn-based Helen Keller Services for the Blind and volunteers at Columbia.

The players preferred the RAD’s interface over that of Mach 1, a popular blind-accessible racing game.

OLDEST REPTILE THAT COULD SHED ITS TAIL TO ESCAPE PREDATORS IDENTIFIED

Scientists have identified ancient reptiles dating back to 289 million years ago that could detach their tails to escape the grasp of their predators - the oldest known example of such behaviour.

The reptiles, called Captorhinus, weighed less than two kilograms and were smaller than the predators of the time.

They were abundant in terrestrial communities during the Early Permian period and are distant relatives of all the reptiles today.

As small omnivores and herbivores, Captorhinus and its relatives had to scrounge for food while avoiding being preyed upon by large meat-eating amphibians and ancient relatives of mammals.

“One of the ways captorhinids could do this was by having breakable tail vertebrae,” said Aaron LeBlanc, PhD student University of Toronto in Canada.

Like many present-day lizard species, such as skinks, that can detach their tails to escape or distract a predator, the middle of many tail vertebrae had cracks in them.

It is likely that these cracks acted like the perforated lines between two paper towel sheets, allowing vertebrae to break in half along planes of weakness.

“If a predator grabbed hold of one of these reptiles, the vertebra would break at the crack and the tail would drop off, allowing the captorhinid to escape relatively unharmed,” said Robert Reisz, professor at the University of Toronto.

Being the only reptiles with such an escape strategy may have been a key to their success, because they were the most common reptiles of their time, and by the end of the Permian period 251 million years ago, captorhinids had dispersed across the ancient supercontinent of Pangaea.

This trait disappeared from the fossil record when Captorhinus died out; it re-evolved in lizards only 70 million years ago.

They were able to examine more than 70 tail vertebrae - both juveniles and adults - and partial tail skeletons with splits that ran through their vertebrae.

The study, published in the journal Scientific Reports, compared these skeletons to those of other reptilian relatives of

captorhinids, but it appears that this ability is restricted to this family of reptiles in the Permian period.

Using various paleontological and histological techniques, the authors discovered that the cracks were features that formed naturally as the vertebrae were developing.

Interestingly, the research team found that young captorhinids had well-formed cracks, while those in some adults tended to fuse up.

This makes sense, since predation is much greater on young individuals and they need this ability to defend themselves.

NOVEL 3D-PRINTABLE ALLOY FOR FLEXIBLE DEVICES, SOFT ROBOTS

Scientists have developed a novel alloy that can be used to 3D-print components for computer screens and stretchable electronic devices, and soft robots.

The advance by researchers at Oregon State University in the US also paves the way toward the 3D printing of tall, complicated structures with a highly conductive gallium alloy.

Researchers put nickel nanoparticles into the liquid metal, galinstan, to thicken it into a paste with a consistency suitable for additive manufacturing.

“The runny alloy was impossible to layer into tall structures,” said Yigit Menguc, assistant professor at OSU.

“With the paste-like texture, it can be layered while maintaining its capacity to flow, and to stretch inside of rubber tubes,” said Menguc.

“We demonstrated the potential of our discovery by 3D printing a very stretchy two-layered circuit whose layers weave in and out of each other without touching,” he said.

Gallium alloys are already being used as the conductive material in flexible electronics; the alloys have low toxicity and good conductivity, plus they’re inexpensive and “self-healing” - able to attach back together at break points.

However, prior to the modification developed at OSU, which used sonication - the energy of sound - to mix the nickel particles and the oxidized gallium into the liquid metal, the alloys’ printability was restricted to two-dimensional.

For the study published in the journal *Advanced Materials Technologies*, scientists printed structures up to 10 millimetres high and 20 millimetres wide.

“Liquid metal printing is integral to the flexible electronics field,” said Dogan Yirmibesoglu, PhD student at OSU.

“Additive manufacturing enables fast fabrication of intricate designs and circuitry,” said Yirmibesoglu.

The field features a range of products including electrically conductive textiles; bendable displays; sensors for torque, pressure and other types of strain; wearable sensor suits, such as those used in the development of video games; antennae; and biomedical sensors.

“It’s easy to imagine making soft robots that are ready for operation, that will just walk out of the printer,” said Yirmibesoglu said.

The gallium alloy paste demonstrates several features new to the field of flexible electronics, added co-corresponding author Uranbileg Daalkhajav, PhD candidate at OSU.

JUPITER’S MYSTERY JET-STREAMS RUN DEEPER THAN THOUGHT: STUDY

Mysterious red and yellow stripes visible on the surface of the gas-giant Jupiter run deep into its atmosphere and last longer than similar processes on Earth, according to data from NASA’s Juno mission.

The findings will improve understanding of Jupiter’s interior structure, core mass and, eventually, its origin.

The depth to which the roots of Jupiter’s famous zones and belts extend has been a mystery for decades. Gravity measurements collected by Juno during its close flybys of the planet have now provided an answer.

“Juno’s measurement of Jupiter’s gravity field indicates a north-south asymmetry, similar to the asymmetry observed in its zones and belts,” said Luciano Iess, from Sapienza University of Rome.

On a gas planet, such an asymmetry can only come from flows deep within the planet; and on Jupiter, the visible eastward and westward jet streams are likewise asymmetric north and south.

The deeper the jets, the more mass they contain, leading to a stronger signal expressed in the gravity field. Thus, the magnitude of the asymmetry in gravity determines how deep the jet streams extend.

“Galileo viewed the stripes on Jupiter more than 400 years ago,” said Yohai Kaspi, from the Weizmann Institute of Science in Israel.

“Until now, we only had a superficial understanding of them and have been able to relate these stripes to cloud features along Jupiter’s jets,” said Kaspi, lead author of the study published in the journal *Nature*.

“Following the Juno gravity measurements, we know how deep the jets extend and what their structure is beneath the visible clouds. It’s like going from a 2D picture to a 3D version in high definition,” he said.

The result was a surprise for the Juno science team because it indicated that the weather layer of Jupiter was more massive, extending much deeper than previously expected.

The Jovian weather layer, from its very top to a depth of 3,000 kilometres, contains about one per cent of Jupiter’s mass (about 3 Earth masses).

“By contrast, Earth’s atmosphere is less than one millionth of the total mass of Earth,” said Kaspi.

Globe Scan

“The fact that Jupiter has such a massive region rotating in separate east-west bands is definitely a surprise,” he said.

Juno’s Jovian Infrared Auroral Mapper (JIRAM) instrument also captured beautiful new imagery of Jupiter’s poles.

Imaging in the infrared part of the spectrum, JIRAM captures images of light emerging from deep inside Jupiter equally well, night or day.

JIRAM probes the weather layer down to 50 to 70 kilometres below Jupiter’s cloud tops.

“Prior to Juno we did not know what the weather was like near Jupiter’s poles. Now, we have been able to observe the polar weather up-close every two months,” said Alberto Adriani, from the Institute for Space Astrophysics and Planetology in Rome.

Jupiter’s poles are a stark contrast to the more familiar orange and white belts and zones encircling the planet at lower latitudes.

Its north pole is dominated by a central cyclone surrounded by eight circumpolar cyclones with diameters ranging from 4,000 to 4,600 kilometres across.

Jupiter’s south pole also contains a central cyclone, but it is surrounded by five cyclones with diameters ranging from 5,600 to 7,000 kilometres in diameter.

LOW-COST, GEN-NEXT GLASS PANELS PAVE WAY FOR SMART WINDOWS

Scientists have developed low-cost glass panels that can selectively allow and block light, paving the way for eco-friendly smart windows that absorb heat in the winter and reflect it in summer.

The principles behind this smart glass technology are simple. It starts with two sheets of plastic separated by a thin cavity.

The plastic contains tiny cube-shaped structures that make the material retroreflective, meaning that it bounces light back to its source, like a bicycle reflector does.

Then the chamber is filled with a fluid called methyl salicylate - an inexpensive wintergreen extract that happens to be the active ingredient in some over-the-counter pain relief creams.

The liquid has optical properties, or interaction with visible light, that match the optical properties of the retroreflective plastic.

When combined, the light can pass through, and the system becomes transparent. This is called refractive index matching.

The smart glass system can switch from transparent to reflective a thousand times without degrading, according to a study published in the journal *Optics Express*.

Instead of utilising cubes, the smart glass relies on the total internal reflection of one-dimensional structures layered

perpendicularly.

It is highly reflective at up to a 60-degree angle of incidence, an improvement over the previous prototype.

“It performed better than we thought it would based on our theoretical understanding,” said Keith Goossen, associate professor at the University of Delaware in the US.

Goossen used 3D printing to make his prototypes, but this technology could eventually be manufactured at a high volume and low cost using injection molding.

He is now testing his system over a wide range of temperatures to see how it performs, especially as it approaches temperatures that could cause the fluid within to freeze, which will be between three and 16 degrees Fahrenheit, depending upon the eventual fluid that is used.

VITAMIN D MAY HELP PREVENT LIVER CANCER

High levels of vitamin D may lower the risk of developing liver cancer, a study has found.

Vitamin D is made by the skin in response to sunlight. It helps to maintain calcium levels in the body to keep bones, teeth and muscles healthy.

While the benefits of vitamin D on bone diseases are well known, there is growing evidence that Vitamin D may benefit other chronic diseases, including some cancers.

However, so far, most studies have been carried out in European or American populations, and evidence from Asian populations is limited.

As vitamin D concentrations and metabolism can vary by ethnicity, it is important to find out whether similar effects would be seen in non-Caucasian populations.

Researchers from National Cancer Center and Shiga University of Medical Science in Japan set out to assess whether vitamin D was associated with the risk of total and site specific cancer.

They analysed data from the Japan Public Health Center-based Prospective (JPHC) Study, involving 33,736 male and female participants aged between 40 to 69 years.

Participants provided detailed information on their medical history, diet and lifestyle, and blood samples were taken to measure vitamin D levels.

Vitamin D levels varied depending on the time of year the sample was taken, tending to be higher during the summer and autumn months than in the winter or spring.

After accounting for this seasonal variation, samples were split into four groups, ranging from the lowest to highest levels of vitamin D.

Participants were then monitored for an average of 16 years, during which time 3,301 new cases of cancer were recorded.

After adjusting for several known cancer risk factors,

such as age, weight (BMI), physical activity levels, smoking, alcohol intake and dietary factors, the researchers found that a higher level of vitamin D was associated with a lower (around 20 per cent) relative risk of overall cancer in both men and women.

Higher vitamin D levels were also associated with a lower (30-50 per cent) relative risk of liver cancer, and the association was more evident in men than in women.

The findings support the theory that vitamin D may protect against the risk of cancer, but that there may be a ceiling effect, which may suggest that there are no additional benefits beyond a certain level of vitamin D.

STRESS CAN BE CONTAGIOUS: STUDY

Scientists, including one of Indian origin, have found that stress transmitted from others can change the brain in the same way as a real stress does.

The study, in mice, showed that the effects of stress on the brain are reversed in female mice following a social interaction. This was not true for male mice.

“Brain changes associated with stress underpin many mental illnesses including PTSD, anxiety disorders and depression,” said Jaideep Bains from the University of Calgary in Canada.

“Recent studies indicate that stress and emotions can be contagious. Whether this has lasting consequences for the brain is not known,” Bains said.

For the study, published in the journal *Nature Neuroscience*, the researchers studied the effects of stress in pairs of male or female mice.

They removed one mouse from each pair and exposed it to a mild stress before returning it to its partner.

They then examined the responses of a specific population of cells, specifically CRH (Corticotropin releasing hormone) neurons which control the brain’s response to stress, in each mouse, which revealed that networks in the brains of both the stressed mouse and naïve partner were altered in the same way.

“What was remarkable was that CRH neurons from the partners, who were not themselves exposed to an actual stress, showed changes that were identical to those we measured in the stressed mice,” said Toni-Lee Sterley from the University of Calgary.

The researchers discovered that the activation of these CRH neurons causes the release of a chemical signal, an ‘alarm pheromone’, from the mouse that alerts the partner.

The partner who detects the signal can in turn alert additional members of the group.

This propagation of stress signals reveals a key mechanism for transmission of information that may be critical in the formation of social networks in various species.

The researchers suggested that these findings may also be present in humans.

“We readily communicate our stress to others, sometimes without even knowing it. There is even evidence that some symptoms of stress can persist in family and loved ones of individuals who suffer from PTSD,” Bains said.

“On the flip side, the ability to sense another’s emotional state is a key part of creating and building social bonds,” he added.

ANTIBIOTIC TARGETING GUT BACTERIA MAY TREAT AUTOIMMUNE DISEASE: STUDY

Scientists have found that targeting certain gut bacteria with an antibiotic or vaccine may provide new approach for treating chronic autoimmune conditions.

Bacteria found in the small intestines of mice and humans can travel to other organs and trigger an autoimmune response, according to a study published in the journal *Science*.

“Treatment with an antibiotic and other approaches such as vaccination are promising ways to improve the lives of patients with autoimmune disease,” said Martin Kriegel from the Yale University in the US.

Gut bacteria have been linked to a range of diseases, including autoimmune conditions characterized by immune system attack of healthy tissue.

The researchers focused on *Enterococcus gallinarum*, a bacterium they discovered is able to spontaneously “translocate” outside of the gut to lymph nodes, the liver, and spleen.

In models of genetically susceptible mice, the researchers observed that in tissues outside the gut, *E. gallinarum* initiated the production of auto-antibodies and inflammation - hallmarks of the autoimmune response.

They confirmed the same mechanism of inflammation in cultured liver cells of healthy people, and the presence of this bacterium in livers of patients with autoimmune disease.

Through further experiments, the research team found that they could suppress autoimmunity in mice with an antibiotic or a vaccine aimed at *E. gallinarum*.

With either approach, the researchers were able to suppress growth of the bacterium in the tissues and blunt its effects on the immune system.

“When we blocked the pathway leading to inflammation, we could reverse the effect of this bug on autoimmunity,” said Kriegel.

“The vaccine against *E. gallinarum* was a specific approach, as vaccinations against other bacteria we investigated did not prevent mortality and autoimmunity,” he said.

The vaccine was delivered through injection in muscle to avoid targeting other bacteria that reside in the gut.

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FALSE NEWS TRAVELS FASTER THAN TRUE STORIES ON TWITTER: STUDY

False news on politics travels farther, faster, deeper and more broadly than the truth on Twitter, a study claims.

Researchers found that the spread of false information is essentially not due to robots that are programmed to disseminate inaccurate stories.

Instead, false news speeds faster around Twitter due

to people retweeting inaccurate news items.

“Twitter became our main source of news. But in the aftermath of the tragic events, I realised that a good chunk of what I was reading on social media was rumours; it was false news,” said Soroush Vosoughi from the Massachusetts Institute of Technology (MIT) in the US.

For the study, published in the journal *Science*, the researchers tracked roughly 126,000 cascades of news stories spreading on Twitter, which were cumulatively tweeted over 4.5 million times by about 3 million people, from the years 2006 to 2017.

“We found that falsehood defuses significantly farther, faster, deeper, and more broadly than the truth, in all categories of information, and in many cases by an order of magnitude,” said Sinan Aral from MIT.

According to the study, false news stories are 70 per cent more likely to be retweeted than true stories are.

It also takes true stories about six times as long to reach 1,500 people as it does for false stories to reach the same number of people.

When it comes to Twitter’s “cascades,” or unbroken retweet chains, falsehoods reach a cascade depth of 10 about 20 times faster than facts. And falsehoods are retweeted by unique users more broadly than true statements at every depth of cascade.

“False news is more novel, and people are more likely to share novel information,” said Aral.

“And on social networks, people can gain attention by being the first to share previously unknown (but possibly false) information. Thus, people who share novel information are seen as being in the know,” Aral said.

The researchers examined this “novelty hypothesis” in their research by taking a random subsample of Twitter users who propagated false stories, and analysing the content of the reactions to those stories.

Of the 126,000 cascades, politics comprised the biggest news category, with about 45,000, followed by urban legends, business, terrorism, science, entertainment, and natural disasters.

The spread of false stories was more pronounced for political news than for news in the other categories.

GLOBAL FISHERIES TO BE 20% LESS PRODUCTIVE IN 2300: STUDY

The world’s fisheries will be, on average, 20 per cent less productive in the year 2300, according to a study.

This bleak future will be characterised by 9.6 degrees Celsius increase in mean surface air temperature, nearly 10 times the warming we have seen to this point.

The extended climate warming will drastically alter wind patterns, boost ocean surface temperatures and melt nearly all the sea ice in polar regions.

“These conditions will cause changes in phytoplankton growth and ocean circulation around Antarctica, with the net effect of transferring nutrients from the upper ocean to the deep ocean,” said J Keith Moore from the University of California, Irvine in the US.

“Marine ecosystems everywhere to the north will be increasingly starved for nutrients, leading to less primary production (photosynthesis) by phytoplankton, which form the base of ocean food chains,” Moore said.

The researchers used an empirical model linking plankton growth to present-day fish catches and then factored in dwindling nutrients and plankton populations due to climate warming in the coming centuries.

“By looking at the decline in fish food over time, we can estimate how much our total potential fisheries catch could be reduced,” said Moore.

Months of computations using thousands of central processing units were needed to simulate the climate and oceans up to 2300.

According to the findings, published in the journal *Science*, fisheries in the North Atlantic will be down nearly 60 per cent and those in much of the western Pacific will experience declines of more than 50 per cent in the year 2300.

“The climate is warming rapidly now, but in the ocean, most of that added heat is still right at the surface. It takes centuries for that heat to work its way into the deeper ocean, changing the circulation and removing the sea ice, which is a big part of this process,” Moore said.

“This is what’s going to happen if we don’t put the brakes on global warming, and it’s pretty catastrophic for the oceans,” he added.

NEW APP CAN HELP SMARTPHONES MONITOR YOUR BP

Scientists, including those of Indian-origin, have developed a new smartphone app and hardware that could help measure blood pressure more accurately than existing cuff devices.

The team, from Michigan State University in the US, also discovered a more convenient measurement point.

“We targeted a different artery, the transverse palmar arch artery at the fingertip, to give us better control of the measurement,” said Anand Chandrasekhar, doctoral student at MSU.

“We were excited when we validated this location. Being able to use your fingertip makes our approach much easier and more accessible,” said Chandrasekhar, lead author of the study published in the journal *Science Translational Medicine*.

The approach uses two sensors: an optical sensor on top of a force sensor. The sensor unit and other circuitry are housed in a one centimeter-thick case attached to the back of the

phone.

Users turn on the app and press their fingertip against the sensor unit. With their finger on the unit, they hold their phone at heart level and watch their smartphone screen to ensure they are applying the correct amount of finger pressure.

“A key point was to see if users could properly apply the finger pressure over time, which lasts as long as an arm-cuff measurement,” said Ramakrishna Mukkamala, professor at MSU.

“We were pleased to see that 90 per cent of the people trying it were able to do it easily after just one or two practice tries,” said Mukkamala.

While high blood pressure is treatable with lifestyle changes and medication, only around 20 per cent of people with hypertension have their condition under control.

This invention gives patients a convenient option, and keeping a log of daily measurements would produce an accurate average, discounting an occasional measurement anomaly, Mukkamala said.

The research team will continue to improve accuracy and hopes to pursue more comprehensive testing based on the standard protocol of the Association for the Advancement of Medical Instrumentation.

NASA PROBE TO SEARCH FOR INTERSTELLAR WATER

NASA’s James Webb Space Telescope is set to peer into reservoirs of interstellar water to understand the origin and evolution of key building blocks for habitable planets.

A molecular cloud is an interstellar cloud of dust, gas, and a variety of molecules ranging from molecular hydrogen (H₂) to complex, carbon-containing organics.

Molecular clouds hold most of the water in the universe, and serve as nurseries for newborn stars and their planets.

Within these clouds, on the surfaces of tiny dust grains, hydrogen atoms link with oxygen to form water. Carbon joins with hydrogen to make methane.

Nitrogen bonds with hydrogen to create ammonia. All of these molecules stick to the surface of dust specks, accumulating icy layers over millions of years.

The result is a vast collection of “snowflakes” that are swept up by infant planets, delivering materials needed for life as we know it.

“If we can understand the chemical complexity of these ices in the molecular cloud, and how they evolve during the formation of a star and its planets, then we can assess whether the building blocks of life should exist in every star system,” said Melissa McClure of the Universiteit van Amsterdam in Netherlands.

To understand these processes, researchers will examine a nearby star-forming region to determine which ices are present

where.

“We plan to use a variety of Webb’s instrument modes and capabilities, not only to investigate this one region, but also to learn how best to study cosmic ices with Webb,” said Klaus Pontoppidan of the Space Telescope Science Institute (STScI), an investigator on McClure’s project.

The project will take advantage of Webb’s high-resolution spectrographs to get the most sensitive and precise observations at wavelengths that specifically measure ices.

Webb’s spectrographs, NIRSpec and MIRI, will provide up to five times better precision than any previous space telescope at near- and mid-infrared wavelengths.

The team plans to target the Chamaeleon Complex, a star-forming region visible in the southern sky.

It is located about 500 light-years from Earth and contains several hundred protostars, the oldest of which are about 1 million years old.

The team will use Webb’s sensitive infrared detectors to observe stars behind the molecular cloud. As light from those faint, background stars passes through the cloud, ices in the cloud will absorb some of the light.

By observing many background stars spread across the sky, astronomers can map ices within the cloud’s entire expanse and locate where different ices form.

They will also target individual protostars within the cloud itself to learn how ultraviolet light from these nascent stars promotes the creation of more complex molecules.

Astronomers also will examine the birthplaces of planets, rotating disks of gas and dust known as protoplanetary disks that surround newly formed stars.

They will be able to measure the amounts and relative abundances of ices as close as five billion miles from the infant star, which is about the orbital distance of Pluto in our solar system.

“Comets have been described as dusty snowballs. At least some of the water in Earth’s oceans likely was delivered by the impacts of comets early in our solar system’s history. We’ll be looking at the places where comets form around other stars,” said Pontoppidan.

FEAR AMONG VOTERS LED TO BREXIT, TRUMP ELECTION: STUDY

Fear and the global rise of populism may have led to the unexpected election of US President Donald Trump and the UK Brexit results, say scientists who analysed data from millions of UK and US citizens.

The study shows that psychological hardships, which did not shape earlier election results, is now a major factor determining election outcomes associated with a rise in populism.

“Both campaigns traded on themes of fear, lost pride

and loss aversion which tap into fear-prone personalities; a construct not previous associated with the behaviour of voters,” said Martin Obschonka, from Queensland University of Technology (QUT) in Australia.

“Typically experts agree that is was economic hardship and some form of ‘protest’ that lead many people to vote for Trump and Brexit,” said Obschonka.

“However, our study adds a new perspective in showing the link to regional fear-based personalities which also fits with recent observations about the global rise of populism,” he said.

“If this is true then one would expect populist campaigns and themes, playing with, and evoking, fears of regional populations, to be particularly successful in regions higher in a fear-prone personality. This is exactly what we found in both the UK and the United States,” he said.

“Our study reveals how psychological hardship is now shaping the global political landscape. One could also call this an ‘irrational’ voting behaviour as it was not predictable by means of rational models,” he added.

Neurotic personality traits included anxiety and depression and these traits are playing a greater role in voting than more positive personality attributes such as openness and conscientiousness.

“So the campaigns of fear worked. Our analysis provides support for the widespread account of the appeal of the populist messages promoted by the Brexit and Trump camps,” Obschonka said.

The research, published in the journal *Social Psychological and Personality Science*, indicated clear support for Brexit and Trump in old industrial centres showing ongoing economic decline.

“The role of regional fear, depression, and neuroticism in predicting which way voters will swing has not been identified before and may well have been a latent factor lying dormant until the right conditions prevailed,” Obschonka said.

“In summary, fear, depression, and neuroticism appear to exert a ‘sleeping effect’ with the potential to have a profound impact on the global political landscape, especially in an era in which we are seeing a rise in nationalism and fear of others worldwide,” he said.

NASA SATELLITES RECREATE SOLAR ERUPTION IN 3D

Scientists have mapped and recreated solar bursts in 3D using three NASA satellites, an advance that may help predict how such events may affect weather around Earth, endanger spacecraft and astronauts.

The new models can help see how shocks associated with coronal mass ejections (CMEs) propagate from the Sun by combining data from three satellites to produce a much more

robust mapping of a CME than any one could do alone.

Much the way ships form bow waves as they move through water, CMEs set off interplanetary shocks when they erupt from the Sun at extreme speeds, propelling a wave of high-energy particles.

These particles can spark space weather events around Earth, endangering spacecraft and astronauts.

Understanding a shock's structure - particularly how it develops and accelerates - is key to predicting how it might disrupt near-Earth space.

However, without a vast array of sensors scattered through space, these things are impossible to measure directly.

Instead, scientists rely upon models that use satellite observations of the CME to simulate the ensuing shock's behaviour.

Researchers from George Mason University and Johns Hopkins University in the US pulled observations of two different eruptions from three spacecraft: ESA/NASA's Solar and Heliospheric Observatory (SOHO) and NASA's twin Solar Terrestrial Relations Observatory (STEREO) satellites.

One CME erupted in March 2011 and the second, in February 2014.

The scientists fit the CME data to their models - one called the "croissant" model for the shape of nascent shocks, and the other the "ellipsoid" model for the shape of expanding shocks - to uncover the 3D structure and trajectory of each CME and shock.

Each spacecraft's observations alone were not sufficient to model the shocks. However, with three sets of eyes on the eruption, each of them spaced nearly evenly around the Sun, the scientists could use their models to recreate a 3D view.

The study, published in the Journal of Space Weather and Space Climate, confirmed long-held theoretical predictions of a strong shock near the CME nose and a weaker shock at the sides.

In time, shocks travel away from the Sun, and thanks to the 3D information, the scientists could reconstruct their journey through space.

The modelling helps scientists deduce important pieces of information for space weather forecasting - in this case, for the first time, the density of the plasma around the shock, in addition to the speed and strength of the energized particles.

All of these factors are key to assessing the danger CMEs present to astronauts and spacecraft.

'SUPER-EARTH' THAT MAY HOST WATER AMONG 15 NEW PLANETS DISCOVERED

Scientists have discovered 15 new planets - including one 'super-Earth' that could harbour liquid water - orbiting small, cool stars near our solar system.

These stars, known as red dwarfs, are of enormous interest for studies of planetary formation and evolution.

The team led by Teruyuki Hirano of Tokyo Institute of Technology in Japan validated 15 exoplanets orbiting red dwarf systems.

One of the brightest red dwarfs, K2-155 that is around 200 light years away from Earth, has three transiting super-Earths, which are slightly bigger than our own planet.

Of those three super-Earths, the outermost planet, K2-155d, with a radius 1.6 times that of Earth, could be within the host star's habitable zone.

The findings, published in The Astronomical Journal, are based on data from NASA Kepler spacecraft's second mission, K2, and follow-up observations using ground-based telescopes, including the Subaru Telescope in Hawaii and the Nordic Optical Telescope (NOT) in Spain.

The researchers found that K2-155d could potentially have liquid water on its surface based on 3D global climate simulations.

A more precise estimate of the radius and temperature of the K2-155 star would be needed to conclude definitively whether K2-155d is habitable.

Achieving such precision would require further studies, for example, using interferometric techniques, researchers said.

A key outcome from the current studies was that planets orbiting red dwarfs may have remarkably similar characteristics to planets orbiting solar-type stars.

"It's important to note that the number of planets around red dwarfs is much smaller than the number around solar-type stars," said Hirano.

"Red dwarf systems, especially coolest red dwarfs, are just beginning to be investigated, so they are very exciting targets for future exoplanet research," he said.

NOW, USE GOOGLE AI TO HUNT PLANETS FROM NASA DATA

Google's artificial intelligence (AI) system that analyses data from NASA's planet-hunting probe to identify the most promising signals has now been made public to help amateur scientist spot new worlds in the universe.

The system has recently discovered two exoplanets by training a neural network to analyse data from NASA's Kepler space telescope and accurately identify the most promising planet signals.

This was done by an initial analysis of about 700 stars.

"We consider this a successful proof-of-concept for using machine learning to discover exoplanets, and more generally another example of using machine learning to make meaningful gains in a variety of scientific disciplines," Chris Shallue, Senior Software Engineer with the Google Brain Team wrote in a blog

post.

“We are excited to release our code for processing the Kepler data, training our neural network model, and making predictions about new candidate signals,” Shallue wrote.

“We hope this release will prove a useful starting point for developing similar models for other NASA missions, like K2 (Kepler’s second mission) and the upcoming Transiting Exoplanet Survey Satellite mission,” he wrote.

The Kepler telescope hunts for planets by measuring the brightness of a star over time. When a planet passes in front of the star, it temporarily blocks some of the light, which causes the measured brightness to decrease and then increase again shortly.

However, other astronomical and instrumental phenomena can also cause the measured brightness of a star to decrease, including binary star systems, star spots, cosmic ray hits on Kepler’s photometer, and instrumental noise.

To search for planets in Kepler data, scientists use automated software to detect signals that might be caused by planets, and then manually follow up to decide whether each signal is a planet or a false positive.

To avoid being overwhelmed with more signals than they can manage, the scientists apply a cutoff to the automated detections: those with signal-to-noise ratios above a fixed threshold are deemed worthy of follow-up analysis, while all detections below the threshold are discarded.

Even with this cutoff, to date, over 30,000 detected Kepler signals have been manually examined, and about 2,500 of those have been validated as actual planets.

The Google Brain team applies machine learning to a

diverse variety of data, from human genomes to sketches to formal mathematical logic.

“Considering the massive amount of data collected by the Kepler telescope, we wondered what we might find if we used machine learning to analyse some of the previously unexplored Kepler data,” Shallue said.

In collaboration with University of Texas at Austin in the US, the team developed a neural network to help search the low signal-to-noise detections for planets.

About 30,000 Kepler signals had already been manually examined and classified by humans.

“We used a subset of around 15,000 of these signals, of which around 3,500 were verified planets or strong planet candidates, to train our neural network to distinguish planets from false positives,” Shallue said.

The system was tested for its effectiveness by searching for new planets in a small set 670 stars.

“We chose these stars because they were already known to have multiple orbiting planets, and we believed that some of these stars might host additional planets that had not yet been detected,” Shallue said.

“We allowed our search to include signals that were below the signal-to-noise threshold that astronomers had previously considered,” he said.

The neural network rejected most of these signals as spurious detections, but a handful of promising candidates rose to the top, including two newly discovered planets: Kepler-90 i and Kepler-80 g.

The model is now available to the public, allowing researchers to train it further and discover more planets.

