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SIX EXOPLANETS FOUND ORBITING A NEARBY BRIGHT STAR

Relevant for: Science & Technology | Topic: Space Technology & related matters

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December 02, 2023 09:05 pm | Updated 09:05 pm IST

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A rare family of six exoplanets has been unlocked with the help of ESA's Cheops mission | Photo Credit: ESA

Six exoplanets orbiting around a nearby bright star (HD 110067) in the Coma Berenices constellation has been discovered. The planets have radii between that of Earth and Neptune. A study published in *Nature* has calculated the orbit details, along with estimates of their masses and densities, which offer clues about the formation of the system and compositions of the planets' atmospheres.

Planets with radii between that of the Earth and Neptune (referred to as 'sub-Neptunes') are found in close-in orbits around more than half of all Sun-like stars, but details of their composition, formation and evolution are not well understood. HD 110067 is a bright star in the Coma Berenices constellation (around 100 light-years away), which is visible from Earth's Northern Hemisphere.

Observations of HD 110067 made by NASA's Transiting Exoplanet Survey Satellite (TESS) in 2020 and 2022 revealed several dips in the star's brightness, and with additional observations from the 'CHaracterising ExOPlanets Satellite' (CHEOPS) the signals were interpreted as six planets passing in front of the star, report Rafael Luque and colleagues. By studying the three innermost planets, the authors calculated the orbits of all six planets, ranging from around nine days for the innermost planet to around 54 days for the outermost planet.

The authors have calculated the masses of the planets and estimate the densities, which are relatively low; the authors suggest that the low densities could be explained by large, hydrogen-rich atmospheres. All six planets are in resonant orbits, in which the planets exert regular forces on each other as they orbit. This feature suggests that the system remains practically unchanged since its birth, at least four billion years ago.

HD 110067 is the brightest star found to host more than four transiting exoplanets to date, the authors note, and add that more planets may exist within or beyond the temperate zone, although such observations have not been made so far. They conclude that the HD 110067 system offers a chance to learn more about sub-Neptunes and how systems in this configuration might form.

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THE TRANSFORMATIVE BENEFITS OF POPULATION-LEVEL GENOME SEQUENCING

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

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December 03, 2023 01:30 pm | Updated 05:17 pm IST

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Geometric illustration of a crowd of human figures. | Photo Credit: Getty Images/iStockphoto

In the last decade, genomics has undergone a revolutionary shift with the advent of technologies that have significantly improved throughput and reduced the cost of whole-genome sequencing, giving rise to population-scale genome-sequencing programmes – where scientists decipher the complete genetic makeup of large populations, offering unprecedented insights into the intricate view and tapestry of human diversity.

This week, the UK announced the completion of half a million whole-genome sequences, almost 0.7% of its population. Such data-sets are transformative, with far-reaching implications for both immediate and long-term advancements in the biological sciences.

An early effort to use large-scale population genetic studies was initiated in Iceland by deCODE genomics in 1996, with most of the Icelandic population enrolling for genetic studies in around a decade's time. The initiative, along with the democratisation of sequencing technologies, provided the initial impetus for programmes that wished to use population-scale genomic data for precision medicine and public health.

The deCODE effort considerably improved our understanding of the genetics of diseases and the utility of such data in risk assessment. It also contributed significantly to the methods, infrastructure, and standards with which researchers handle large-scale genomic data and set up discussions on their bioethics. The project also laid the groundwork to integrate medical records and people's genealogies, resulting in new drugs and therapeutics.

deCODE's success plus the wider availability of sequencing technologies gave rise to a number of population-scale genome initiatives around the world, including many pilot programmes initiated in the last decade. At first, several projects worked with hundreds to thousands of genomes, but in the last half a decade, such endeavours have leapfrogged to lakhs of genomes.

Indeed, one of the first such was the UK's '100K Genome' project, which aimed to bring genomics into routine healthcare. We estimate more than a dozen countries today have genome programmes of a lakh genomes or more. A recent initiative by the pharmaceutical companies Regeneron Genetics Center, AstraZeneca, Novo Nordisk, and Roche, along with the Meharry Medical College, Tennessee, has even planned to sequence more than five lakh individuals of

African ancestry through the Diversity Human Genome Initiative.

Many large-scale genome programs are currently underway, including the AllofUS programme in the U.S., which will collect genetic information of a million people with funding from the National Institutes of Health. The European Union recently launched the '1+ Million Genomes' initiative. A 'Three Million African Genomes' is also currently in the works, as is the Emirati genome programme's scheme to sequence more than a million samples (more than 400,000 have already been completed).

Population-scale genome efforts have significantly diverse objectives. Many programmes take advantage of a unique population composition to understand disease prevalence and biomarkers for diseases, and use that to inform the discovery of novel therapeutic targets. Other efforts seek to build scalable public-health initiatives where genomic data is used in decision-making and medical care.

For example, according to one estimate, 18.5% of the UK's 100K initiative was actionable, translating to direct healthcare benefits to participants.

The cost of whole-genome sequencing is also falling in tandem. Together with a growing body of evidence as to the data's usefulness, it is entirely possible that a significantly large number of humans around the world will have their whole genome sequenced in their lifetimes in the coming decade as well as a similarly significantly large number of people being able to access information derived from sequencing data for routine diagnostic workups and to newborns for diseases.

Of course, just as population-scale programmes open new doors, they also confront new challenges, especially with regard to the ethics of and the access to these genomes, and the discoveries that build on them. There are also significant concerns regarding the equitable representation and access to the fruits of discoveries (e.g. over-representation of certain ethnic groups in population-scale data sets).

Countries like the U.S. have also proactively created regulatory frameworks to prevent the misuse of genetic data, such as to prevent insurance and employment discrimination, using the terms of the Genetic Information Non-discrimination Act.

Asia, and India, are not far off vis-à-vis population-level sequencing either. The GenomeAsia project, led by multiple partners across the continent, plans to sequence a lakh whole genomes from diverse populations. An initial pilot data set with whole genomes of 1,739 individuals belonging to 219 population groups in 64 countries was published in *Nature* in 2019.

A pilot programme for population genomes in India named IndiGen provided an early view of more than a thousand genomes of individuals from cosmopolitan areas in India. It also yielded some clues to the landscape of many treatable genetic diseases and variants of clinical significance, including the efficacy and toxicity of drugs and the prevalence of rare disorders. A larger programme to sequence 10,000 whole genomes from diverse population groups is in the works under the GenomeIndia initiative.

Looking to the horizon, the long-term impact of population-scale genomics extends beyond individual health, shaping our comprehension of human evolution, migration patterns, and adaptation to diverse environments. It will also contribute significantly to our knowledge of human biology. In essence, population-scale genomics stands at the forefront of a genomic revolution, poised to revolutionise healthcare, illuminate our evolutionary history, and propel us towards a future in which precise, personalised approaches will influence the landscape of

medical and biological understanding.

And just as the day when we will sequence a billion genomes in a single project isn't far off, the time for an individual acquiring a right to access and understand their own genome sequence is also at hand.

The authors are senior consultants at the Vishwanath Cancer Care Foundation and adjunct professors at IIT Kanpur. All opinions expressed here are personal.

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TOP WHITE HOUSE CYBER AIDE SAYS RECENT IRAN HACK ON WATER SYSTEM IS CALL TO TIGHTEN CYBERSECURITY

Relevant for: Security Related Matters | Topic: Basics of Cyber Security and related matters

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December 09, 2023 09:56 am | Updated 09:56 am IST

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FILE PHOTO: Miniatures of people with computers are seen in front of binary codes and words 'Cyber attack' in this illustration taken July 19, 2023. REUTERS/Dado Ruvic/Illustration/File Photo/File Photo | Photo Credit: Dado Ruvic

A top White House national security official said recent cyber attacks by Iranian hackers on U.S. water authorities — as well as a separate spate of ransomware attacks on the health care industry — should be seen as a call to action by utilities and industry to tighten cybersecurity.

Deputy national security adviser Anne Neuberger said in an interview on Friday that recent attacks on multiple American organisations by the Iranian hacker group "Cyber Av3ngers" were "unsophisticated" and had "minimal impact" on operations. But the attacks, Neuberger said, offered a fresh warning that American companies and operators of critical infrastructure "are facing persistent and capable cyber attacks from hostile countries and criminals" that are not going away.

"Some pretty basic practices would have made a big difference there," said Neuberger, who serves as a top adviser to President Joe Biden on cyber and emerging technology issues. "We need to be locking our digital doors. There are significant criminal threats, as well as capable countries — but particularly criminal threats — that are costing our economy a lot."

The hackers, who U.S. and Israeli officials said are tied to Tehran's Islamic Revolutionary Guard Corps, breached multiple organisations in several states including a small municipal water authority in the western Pennsylvania town of Aliquippa. The hackers said they were specifically targeting organisations that used programmable logic controllers made by the Israeli company Unitronics, commonly used by water and water treatment utilities.

(For top technology news of the day, subscribe to our tech newsletter Today's Cache)

Matthew Mottes, the chairman of the Municipal Water Authority of Aliquippa, which discovered it had been hacked on Nov 25, said that federal officials had told him the same group also breached four other utilities and an aquarium.

The Aliquippa hack prompted workers to temporarily halt pumping in a remote station that regulates water pressure for two nearby towns, leading crews to switch to manual operation.

The hacks, which authorities said began on Nov. 22, come as already fraught tensions between the U.S. and Iran have been heightened by the two-month-old Israel-Hamas war. The White House said that Tehran has supported Houthi rebels in Yemen who have carried out attacks on commercial vessels and have threatened U.S. warships in the Red Sea.

Iran is the chief sponsor of both Hamas, the militant group which controls Gaza, as well as the Houthi rebels in Yemen.

The U.S. has said they have uncovered no information that Iran was directly involved in Hamas' Oct. 7 attack on Israel that triggered the massive retaliatory operation by Israeli Defense Forces in Gaza. But the Biden administration is increasingly voicing concern about Iran attempting to broaden the Israeli-Hamas conflict through proxy groups and publicly warned Tehran about the Houthi rebels' attacks.

"They're the ones with their finger on the trigger," White House national security adviser Jake Sullivan told reporters earlier this week. "But that gun — the weapons here are being supplied by Iran. And Iran, we believe, is the ultimate party responsible for this."

Neuberger declined to comment on whether the recent cyber attack by the Iranian hacker group could portend more hacks by Tehran on U.S. infrastructure and companies. Still, she said the moment underscored the need to step up cybersecurity efforts.

The Iranian "Cyber Av3ngers" attack came after a federal appeals court decision in October prompted the EPA to rescind a rule that would have obliged U.S public water systems to include cybersecurity testing in their regular federally mandated audits. The rollback was triggered by a federal appeals court decision in a case brought by Missouri, Arkansas and Iowa, and joined by a water utility trade group.

Neuberger said that measures spelled out in the scrapped rule to beef up cybersecurity for water systems could have "identified vulnerabilities that were targeted in recent weeks."

The administration, earlier this year, unveiled a wide-ranging cybersecurity plan that called for bolstering protections on critical sectors and making software companies legally liable when their products don't meet basic standards.

Neuberger also noted recent criminal ransomware attacks that have devastated health care systems, arguing those attacks spotlight the need for government and industry to take steps to tighten cyber security.

A recent attack targeting Ardent Health Services prompted the health care chain that operates 30 hospitals in six states to divert patients from some of its emergency rooms to other hospitals while postponing certain elective procedures. Ardent said it was forced to take its network offline after the Nov 23 cyberattack.

A recent global study by the cybersecurity firm Sophos found nearly two-thirds of health care organizations were hit by ransomware attacks in the year ending in March, double the rate from two years earlier but dipping slightly from 2022.

"The president's made it a priority. We're pushing out actionable information. We're pushing out advice," Neuberger said. "And we really need the partnership of state and local governments

and of companies who are operating critical services to take and implement that advice quickly."

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technology (general) / cyber crime

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INDIA'S ALARMING 'FIXED DOSE COMBINATION' PROBLEM

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December 09, 2023 12:16 am | Updated 08:08 am IST

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'The FDC problem has been on the regulatory radar since 1978' | Photo Credit: Getty Images

A group of academics from India, Qatar and the United Kingdom recently published a worrying new study in the Journal of Pharmaceutical Policy and Practice (2023, 16:39) on the volume of unapproved and even banned fixed dose combination (FDC) of antibiotics that are being sold in India. Using sales data of the pharmaceutical industry, the study documents that in the year 2020, 60.5% FDCs of antibiotics (comprising 239 formulations) were unapproved and another 9.9% (comprising 39 formulations) were being sold despite being banned in the country. That so many of these unapproved or banned FDCs contain antibiotics is alarming because of the increasing prevalence of antibacterial microbial resistance (AMR) in India.

FDCs are combinations of one or more known drugs and can be useful in the treatment of some diseases since the combination can improve patient compliance. For instance, if a patient has to take three different medications for a particular treatment, she may forget to take one. But if all three medications are combined into one tablet or one syrup, the chance of her forgetting to take one or two of the drugs is reduced. For diseases such as AIDS, it is well documented that FDCs have proven to be very useful in improving patient compliance, which at the end of day improves treatment outcomes.

Making FDCs, even though most consist of drugs with known safety and efficacy profile, is not an easy job. All drugs have side effects and when formulated together, there is a possibility that the active ingredient or even the excipients (inactive ingredients) may affect the way that each drug functions. For example, the drugs may interact in a way to reduce the therapeutic efficacy of each active ingredient, or, worse, the drugs may interact with each other to create a more toxic element, often called metabolites. This is why it is crucial that all FDCs go through a scientifically designed approval process where such interactions can be evaluated.

Pharmaceutical companies in India use these FDCs to escape liability under multiple laws without much concern for public health. One such law is the Drugs (Prices Control) Order (DPCO), under which the government fixes the prices of individual drugs. Since drug combinations were traditionally not covered under the DPCO, the pharmaceutical industry decided that making FDCs provided an easy way to escape the remit of the DPCO.

Also read |Manufacture and sale of 344 FDC drugs banned

Driven by this cold logic of the market, and not public health, the Indian pharmaceutical industry introduced an astounding variety of FDCs that lacked any medical rationale. For example, anti-inflammatory drugs were combined with vitamins, anti-histamines were combined with anti-diarrhoeal agents, penicillin was combined with sulphonamides, and vitamins were combined with analgesics. These were combinations not found in any other country.

There were two added advantages of adopting this strategy for the industry. The first, the fact that because of the bewildering variety of FDCs being sold in the market, there were no standards set by bodies such as the Indian Pharmacopoeia Commission for testing these drugs for quality of manufacture. When there are no standards recognised by the law, there is no question of manufacturing "not of standard quality" drugs, and hence there is no possibility of prosecution under the Drugs & Cosmetics Act, 1940. At most, when these FDCs are sampled in the market and sent for testing, the usual protocol for government laboratories conducting such tests is to write to the manufacturer and ask for their own protocols to test the drug. In other words, the pharmaceutical industry gets to provide its own standards in order for the government to test their drugs.

The second advantage of going down the FDC route is that it gives individual companies a reason to charge higher prices for their drugs. For example, if 20 different pharmaceutical companies were manufacturing and selling a drug such as azithromycin, they would have to compete furiously and reduce prices to capture a larger share of the market. But if they combine azithromycin with another drug, for example, cefixime to create a FDC, they can claim it as a new unique product catering to a specific need, thereby allowing them to charge a higher price until others introduce similar products, at which point the first mover may try to create a new FDC. When the market and the regulatory structure rewards these manufacturers of such pseudo-innovation rather than for discovering and developing true innovative medicines, this is what happens. These dubious FDCs can command higher prices. Of course, none of this is possible without doctors who are willing to prescribe such FDCs. While it is tempting to paint all such doctors as corrupt, the fact of the matter is that most doctors wrongly presume that the drug regulator is doing its job when a product is sold on the market.

The FDC problem has been on the regulatory radar since 1978 when the first government committee studied the issue and admitted that we had a problem on our hands. At the time, there was no system under the colonial-era Drugs and Cosmetics Act, 1940 to vet drugs for safety and efficacy prior to their sale in India. This meant that each State drug controller could hand out manufacturing licences for any drug formulation and there was little that the central government could do to stop their sale.

In 1982, Parliament changed the law to give the central government the power to "prohibit" the manufacture of specific drugs that lack therapeutic value or justification. Later in that decade, in 1988, the central government amended the rules to introduce a new requirement for manufacturers of all "new drugs", including FDCs, to submit proof of safety and efficacy to the Drugs Controller General of India (DCGI) who heads the Central Drugs Standard Control Organization (CDSCO). These amendments also made it clear that State drug controllers could not grant "manufacturing licences" for "new drugs" that are not approved for safety and efficacy by the DCGI.

Despite the law being crystal clear on the issue, State drug controllers have simply ignored the law to continue issuing manufacturing licences for FDCs not approved by the DCGI with impunity. The manufacturers selling these FDCs that have not been approved by the DCGI can technically be prosecuted by the Central government for violating the law.

Instead of ordering criminal prosecutions, the Ministry of Health is playing a game of whack-a-

mole by constantly invoking its powers under Section 26A to prohibit the manufacture of specific FDCs. It has issued 444 orders under this provision since 1983, banning mostly FDCs. Many of these orders have been embroiled in complex litigation, with the courts muddying the waters with inconsistent decisions.

Also read | National Medical Commission lists drugs which can be sold without prescription

The fact that these academics have discovered 239 unapproved FDCs being sold in 2020 in just one category of FDCs (their previous studies have revealed similar unapproved FDCs in other therapeutic categories), more than 42 years after the problem was first flagged is an astonishing indictment of the incompetence of the drug regulatory framework in India. As they point out in their paper, unregulated FDCs may end up contributing to the AMR problem in India. It is vital for the Ministry of Health to take immediate action.

Dinesh S. Thakur and Prashant Reddy T. are the co-authors of The Truth Pill: The Myth of Drug Regulation in India *(2022)*

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India / pharmaceutical / prescription drugs / health treatment / disease / laws

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GOOGLE GEMINI

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 10, 2023 01:05 am | Updated 02:09 am IST

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Gemini has shifted AI in a direction more expansive that just a talking chatbot | Photo Credit: Dado Ruvic

For a year now, Google has been playing catch-up with OpenAI. Since the release of ChatGPT marked a momentous occasion in what has become the age of AI, the lumbering search giant was seen scrambling to put their next foot forward. Google, a company that was aggressive in releasing AI research but slow at releasing tools to the public, had been outmanoeuvred by a nifty startup. The threat of the AI chatbot was great enough for CEO Sundar Pichai to pull the fire alarm and declare a 'Code Red' situation at the company. Founders Sergei Brin and Larry Page came out of retirement at Mr. Pichai's behest.

After reports of delays and a long wait, Google released their new AI model Gemini on Wednesday. And now was as opportune a moment as any. A couple of weeks ago, OpenAI had been caught in a board coup that had ended up temporarily ousting CEO Sam Altman. Google was certainly looking to capitalise on the ripple of uncertainty that had shaken up its competitor.

Google's treasure trove of multimodal data from search and YouTube had come to its rescue. Gemini had been trained to learn about the world like a baby — changing our perception of what a large language model is supposed to be. It didn't just read data and seemingly regurgitate it; it could understand what an image or an audio was. This multimodal ability was a much rounder way of "intelligence".

Where the standard approach to build multi-modal models usually means training the different components for different modalities, Gemini was trained on multiple modalities from the ground-up. Because of this Google termed Gemini "natively multimodal".

Demo videos of the model drew impressed reactions. There were things Gemini was seen doing in the videos that we haven't seen any AI model do as yet. Like it could figure out that a dot-to-dot picture was a crab even before it had been finished, or even track a ball of paper from under a plastic cup and spot sleight-of-hand tricks.

Unlike most models which are trained on graphics processing units or GPUs, Gemini was trained using Google's in-house designed tensor processing units or TPUs, which bodes well considering the overarching GPU shortages that plague most companies building their own AI models.

Gemini comes in three sizes meant for a range of platforms — Nano was designed for on-device tasks like summarising text and making suggestions in chat applications; Gemini Pro was the model currently underlying its AI-powered chatbot Bard; and Gemini Ultra, the multimodal version, will be released sometime next year once trust and safety checks are completed. The model will be made available to developers through Google Cloud's API from December 13. Gemini is also the most product-oriented than most models in the market as it is enmeshed in the Google ecosystem.

Also read | What is multimodal artificial intelligence and why is it important?

Some digging into Google's claims revealed some more truths. Wharton professor Ethan Mollick demonstrated that ChatGPT could comfortably replicate some of the tasks that had initially seemed impressive in the Gemini demo, like analysing an image step-by-step. Another associate professor from the University of Wisconsin-Madison, Dimitris Papailiopoulos, tried 14 examples of multimodal reasoning that the Gemini research paper had presented, on ChatGPT-4. GPT4V got 12 of these instances right with a couple of responses even better than Gemini's.

Google also admitted that the demo videos were edited to shorten the response time. Inquiries made by Bloomberg revealed that the seemingly flowing conversation between Gemini and the user in the video had been an inserted voice. In reality, the prompts were made via text while the model was shown images consecutively. The embarrassing gaffe made in the live demo during Bard's release was something that the company desperately would have wanted to avoid. But despite the caveat of good marketing, Gemini has shifted AI in a direction more expansive that just a talking chatbot.

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US APPROVES TWO GENE THERAPIES FOR SICKLE CELL DISEASE

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

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December 09, 2023 05:07 pm | Updated 05:07 pm IST

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This electron microscope image provided by the National Institutes of Health in 2016 shows a blood cell altered by sickle cell disease, top. | Photo Credit: AP

The U.S. Food and Drug Administration (FDA) on Friday approved a pair of gene therapies for sickle cell disease, including the first treatment based on the breakthrough CRISPR gene editing technology.

The agency approved Lyfgenia from bluebird bio, and a separate treatment called Casgevy by partners Vertex Pharmaceuticals and CRISPR Therapeutics.

Both the therapies were approved for people aged 12 years and older.

The Vertex/CRISPR gene therapy uses the breakthrough gene editing technology that won its inventors the Nobel Prize in 2020.

Sickle cell disease is a painful, inherited blood disorder that can be debilitating and lead to premature death. It affects an estimated 100,000 people in the United States, most of whom are Black.

In sickle cell disease, the body makes flawed, sickle-shaped hemoglobin, impairing the ability of red blood cells to properly carry oxygen to the body's tissues.

The sickle cells tend to stick together and can block small blood vessels, causing intense pain. It also can lead to strokes and organ failure.

U.S.-listed shares of CRISPR therapeutics were up 1.6%, while Vertex Pharmaceuticals stock was down 1.4%. Shares of bluebird bio were halted for trading ahead of the news.

Makers of both the therapies have pitched them as one-time treatments, but data on how long their effect lasts is limited. The only longer-term treatment for sickle cell disease is a bone marrow transplant.

"I actually am very reticent to call them a cure. I prefer to call them a transformative therapy because patients will still have sickle cell disease on the other side of gene therapy," said Dr

Sharl Azar, medical director of the Comprehensive Sickle Cell Disease Treatment Center at Massachusetts General Hospital.

Bluebird bio's sickle cell therapy is designed to work by inserting modified genes into the body through disabled viruses to help the patient's red blood cells produce normal hemoglobin.

For Vertex's therapy, patients must have stem cells harvested from their bone marrow. The cells are then sent to manufacturing facilities where they are edited using CRISPR/Cas9 technology. Once the cells are incubated, they are infused back into the patient during a month-long hospital stay.

Both gene therapies can take several months and involve high-dose chemotherapy, but this has potential risks of infertility.

"Not everybody who undergoes chemotherapy will end up having infertility, but the majority of them will," said Dr Azar.

While the risk can be managed by fertility preservation methods like freezing eggs and sperm banking, this is only covered by insurance for cancer patients who undergo chemotherapy and not those receiving gene therapy, said Dr. Azar.

He said the out-of-pocket expense on it can be as high as $40,000.

FDA staff in documents released ahead of an October meeting of a panel of independent experts on Vertex's therapy had also flagged concerns of unintended genomic alterations from the treatment.

The company plans to assess potential long-term safety risks through a 15-year follow-up study after approval.

Vertex's CRISPR therapy is also under an FDA review for another blood disease, transfusion-dependent beta thalassemia, with a decision expected by March 30.

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disease / health / genetics / science (general) / medical research

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PROTEIN FROM BUDGETT'S FROG CAN BLOCK ENZYMES OF DISEASE-CAUSING PATHOGENS: STUDY

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 10, 2023 10:39 pm | Updated December 11, 2023 02:19 am IST - Bengaluru:

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According to researchers, frogs have developed a defensive mechanism through their skin, which helps to combat microorganisms.

Researchers from the Indian Institute of Science's (IISc.) molecular biophysics unit in a study have identified that peptides (short protein) produced from Budgett's frog can combat enzymes of disease causing pathogens

According to IISc., peptides (short proteins) produced from the skin of amphibians have long been studied because of their ability to counter unfavourable conditions in the environment, including harmful pathogens.

Mihir Rami, Mohd. Shafique, and Siddhartha Sarma at the unit have studied LL-TIL, one such peptide found in skin secretions of Budgett's frog.

According to Mr. Rami, Budgett's frog found in South America is kept as a pet in many countries because of their intelligent behaviour.

"Frogs are the first vertebrates to conquer the land and all other vertebrates like reptiles, mammals, and birds came after the amphibians. Because of this the frogs have developed a defensive mechanism through their skin. They generally combat the microorganisms and other harmful things through their skins," said Mr. Rami.

The IISc. said that the researchers found that the frog-secreted peptide inhibited two key enzymes called subtilisin carlsberg and proteinase K., produced by pathogens.

"These enzymes play a pivotal role in promoting infections by degrading specific protective proteins of the infected person. The team used various spectroscopic techniques and protein assays to study the binding of the amphibian peptide to the pathogenic enzymes. The peptide was shown to act through a slow-tight binding pathway, and was found to be as effective as SSI, a well-known subtilisin inhibitor," said IISc.

The study further revealed an in-depth mechanism of this inhibitory action, using structural and

dynamic models. The researchers show the formation of a Michaelis complex – a tight, noncovalent complex with the intact inhibitor – during the process. They also studied the effects of modifications to the original sequence of the peptide.

"This provides a framework to engineer more specific and potent TIL-type inhibitors, which can be used against other pathogenic enzymes as well," IISc. said.

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CALIBRATING A STRATEGY FOR INDIA'S FUTURE GROWTH

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 11, 2023 12:16 am | Updated 01:54 am IST

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'India will have to rely relatively more on domestic growth drivers'; | Photo Credit: Getty Images/iStockphoto

India's growth in 2023-24 is currently projected by the Reserve Bank of India at 7% while the International Monetary Fund (IMF) and the World Bank have pegged it at 6.3%. With a growth of 7.8% and 7.6% in the first two quarters of 2023-24, respectively, and a broad-based recovery in the second quarter, India is likely to realise the RBI's currently projected growth of 7% in this fiscal year. In the medium term, the IMF has projected an annual growth of 6.3% up to 2028-29. India's future growth strategy needs to be calibrated in view of the changing global conditions.

There is a movement towards deglobalisation. Many ongoing geopolitical conflicts such as the Russia-Ukraine war and the Israel-Hamas war have created a climate of sanctions, leading to breaks in supply chains as well as disruptions in international settlements due to non-access to systems such as SWIFT for the sanctioned countries. World real GDP growth has also fallen, leading to reduced demand for global exports. Many countries including India want to reduce their dependence on imported petroleum due to supply uncertainties and price volatility.

In India's case, exports experienced a sharp acceleration in the share of GDP during 2003-04 to 2008-09. This peaked at 25% in 2013-14. In 2022-23, it was 22.8%, having fallen to a trough of 18.7% in 2019-20 and 2020-21. The erstwhile export-led growth strategy may not be available to India any more. It has to evolve its own future growth strategy.

India will have to rely relatively more on domestic growth drivers. To achieve and sustain a 7% plus real growth in particular, domestic savings will be critical. We estimate the nominal saving rate in 2022-23 to be about 29%. One area of concern relates to the recently noted fall in the household sector's savings in financial assets which declined to 5.1% of GDP in 2022-23 from an average of 7.8% during the pre-COVID-19 period of 2015-16 to 2019-20 — a fall of 2.7% points. This fall consisted of 2.2% points of increase in change in gross household financial liabilities and 0.5% points fall in change in gross household financial assets. These changes may be temporary post-COVID-19 responses.

However, if these trends persist, it will pose a significant risk to India's growth potential since it is the surplus household sector financial savings that become available to the government and the

corporate sector to draw resources from to meet their investment demand in excess of their own savings.

Savings are converted into gross fixed capital formation (GFCF) by adding net capital inflows and deducting change in stocks, valuables, and discrepancies. The estimated nominal investment rate, that is GFCF relative to GDP was 29.2% in 2022-23. However, the deflator of capital goods is lower than that of all goods. The movement of the relative deflator of capital goods is somewhat volatile. Using the five-year average of the relative magnitude of the two deflators, the nominal investment rate of nearly 29% would provide a real investment rate of about 33%. This needs to be increased by 2% points to provide investible resources amounting to 35% of GDP, enabling a growth of 7% at an Incremental Capital-Output Ratio (ICOR) of 5, which was its value in 2022-23. If the ICOR is lower, achievable growth would be higher.

India would find itself in a unique position in the next three decades with a large potentially employable population seeking jobs in the presence of progressively more labour-saving innovations and technologies. According to United Nations population projections, the share of India's working age population is projected to peak at 68.9% in 2030 while its overall dependency ratio would be at its lowest at 31.2%. These patterns call for increased allocation of resources for training and skilling India's growing working age population.

Employment growth is critically dependent on GDP growth and the structure of output. The growth rate of the working age population is projected to progressively fall from 1.2% in 2023-24 to 0% in 2048-49. In 2022-23, according to the Periodic Labour Force Survey (PLFS), the worker population ratio, showing the number of employed persons in the population above 15 years of age, increased to 51.8% from 44.1% in 2017-18, depicting an average increase of 1.5% points per year. Going forward, non-agricultural growth will have to be high enough to absorb labour released from agriculture which is estimated at 45.8% in 2022-23 by the PLFS. It should also be able to absorb the labour-substituting impact of new technology. Facilitating absorption of productivity-enhancing technologies including Artificial Intelligence (AI) and Generative AI would add to overall growth.

India has committed to certain targets to reduce carbon emissions in view of global climate concerns. In the COP26 Summit, in 2021, India had committed to reducing total carbon emissions by one billion tonnes between 2021 to 2030 and achieving the target of net zero emissions by 2070. India's own initiatives include the Green Grids Initiative (GGI) and One Sun One World One Grid (OSOWOG). It is also placing an emphasis on the use of electric vehicles and ethanol-based and hydrogen fuels. Climate-promoting technological changes may reduce the potential growth rate. This adverse impact can be minimised by emphasising service sector growth which is relatively climate friendly.

Adhering to fiscal responsibility targets is also critical to sustain growth. In recent years, there has been considerable slippage in achieving the fiscal responsibility targets. To sustain growth close to its potential, it is important to ensure that the combined fiscal deficit and debt to GDP ratios are brought down to 6% and 60%, respectively, so that the burden of interest payments relative to revenue receipts is kept within acceptable limits. This would enable achieving a balance or surplus on the revenue account of the central and State governments, which in turn would reduce government dissavings and augment the overall savings rate of the economy.

In the next two years, a growth rate of 6.5% seems feasible. This represents, partially, a recovery from the low growth rate in the COVID-19 period. Over the medium term, India's growth performance will be adversely affected by many factors, both domestic and external. Raising the savings and investment rates, improving the skill acquisition of the young entrants to the labour market and adopting a technology mix which is employment friendly are issues on

which the country must focus to achieve a growth rate of 7% to 7.5%.

C. Rangarajan is former Chairman, Prime Minister's Economic Advisory Council and former Governor, Reserve Bank of India. D.K. Srivastava is Chief Policy Adviser, EY India, and former Director, Madras School of Economics. The views expressed are personal

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IN THE CHAOS OF TURBULENCE, SCIENTISTS CHASE GLIMPSES OF HIDDEN ORDER

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(L-R) Smoke rises from an incense stick; a vortex street stretches out from Alexander Selkirk Island in the Pacific Ocean, December 19, 2019; a person stirs a cup of coffee; the Great Red Spot swirls amid turbulence on Jupiter. | Photo Credit: mfromfaraway/Unsplash; USGS; John Beans/Flickr (CC BY 2.0); NASA Juno

We frequently come in contact with moving fluids like air and water, probably without realising that these mundane daily occurrences are in fact encounters with one of nature's more profound mysteries.

Consider the smoke rising from an incense stick. For a short distance, the plume of smoke remains well-ordered with a definite, if also twisting, shape. Then the plume suddenly breaks up, contorting and swirling into multiple eddies, or whorls. This irregular, seemingly random fluid motion is turbulence.

The disordered patterns of turbulent motion rapidly mix the agarbatti's aroma with the air, allowing you to enjoy the fragrance from across a large room just a few seconds after it is lit. Such turbulent mixing also kickstarts our mornings, when we stir milk and sugar into our tea and coffee: without turbulence, you'd have to wait for about a month to enjoy a uniformly sweetened cup. You also create turbulence with every breath you exhale: the air gushing out of your nostrils forms short-lived and complex flow patterns that become visible on a frigid winter day.

Chaotic fluctuations, sudden bursts of motion, hard-to-predict variations – these features are typical of turbulent flows. Yet they also contain persistent swirling patterns called vortices. In water streams and cloudy skies, vortices have inspired artists and imprinted themselves upon our collective visual consciousness through the work of Leonardo da Vinci and Vincent van Gogh. That turbulence has *ordered patterns* is a testament to its origin in the laws of mechanics: turbulent whorls don't turn on a whim, after all, but are governed by deterministic, well-understood physical forces.

The two key physical effects that determine the state of a fluid's motion are inertia – the tendency of a fluid to keep moving – and viscous friction, which tends to bring all motion to a halt. The strength of inertia increases with the speed of motion, the mass of the fluid, and the distances over which the flow occurs. The strength of friction is determined by the fluid's

viscosity, which is higher for honey, moderate for water, and lower for air.

When viscous effects dominate, a flow is well-ordered and predictable, and disturbances quickly dampen out. There is little mixing and the fluid tends to move as if it were composed of distinct layers, which is why it's called laminar flow. But when inertia dominates, the flow is highly unstable. Without much friction, small disturbances don't die out but instead grow and spread. This is what happens to a rising plume of incense smoke: tiny fluctuations in the air are amplified within the plume, causing it to become turbulent.

The balance between fluid inertia and viscosity (and other forces due to pressure differences and gravity) are precisely described by the Navier-Stokes equations, which extend Newton's law for a rigid body (like a billiard ball) to a fluid. These equations, now about 200 years old, describe both laminar and turbulent flow. They're compact enough to fit on a postcard and don't look formidable – yet they are. Today, we can use powerful supercomputers to solve them to an extent to determine how some turbulent flows might behave, but even this hasn't allowed us to crack all their mysteries.

The key difficulty is that the Navier-Stokes equations are nonlinear: they contain some terms that arise from the fluid's inertia, which manifests in the equations as a product of the velocity with its own spatial variations. Put differently, nonlinearity allows for positive feedback, which allows small initial disturbances to amplify in time and radically change the state of the flow.

The principle of superposition doesn't apply either. If the equations were linear, two or more different solutions – e.g. describing vortices of different sizes in a flow – would evolve independently of one another. This then would mean we could take some complex flow, break it down into simpler components, work them out, and add them all back together to get a sense of the overall flow. But nonlinearity couples all components synergistically – that is, the different vortices interact and transform *each other*, producing a flow whose complexity is greater than the sum of its parts.

Consider the motion of air produced by a ceiling fan. The flow doesn't just consist of one large, room-spanning vortex. Instead, the primary vortex produced by the rotation of the fan's blades is unstable: tiny disturbances amplify and form new smaller secondary vortices. These in turn are susceptible to further instabilities and produce vortices of their own, and so on down to vortices the size of a paperclip.

From the perspective of energy conservation: kinetic energy is injected by the fan directly into the primary vortex. This energy is then handed over to the secondary vortices and so forth until we reach a scale where viscosity prevails – i.e. fluid friction dominates over inertia – and dissipates the kinetic energy as heat. This soup of interacting whorls of all possible sizes is why incense released in one corner of a room quickly makes its way to all nooks and crannies – and it's also why working out the equations is so hard.

The Swedish philosopher Nick Bostrom imagined that in the future, humans will be able to build planet-sized super-computers. Will these colossal machines alleviate the problem of simulating the Navier-Stokes equations? You'd think the answer would be 'yes', but it remains 'it's complicated'. This is because we still won't be able to predict how turbulent eddies evolve over long periods of time.

A system that exhibits nonlinearity is often also a system that's sensitive to its starting conditions. In the extreme, such sensitivity manifests as chaos – discovered as a phenomenon by Edward Lorenz with help from Helen Fetter and Margaret Hamilton, in 1961, when they were looking for a way to model atmospheric convection.

In a chaotic system, a small perturbation grows rapidly such that, in a short span of time, the perturbed flow is as different from an unperturbed one as is physically possible. Chaos thus prevents long-term predictions: minute yet inevitable errors in estimating the current state of the flow – as that of a wind, for example – eventually render long term predictions on a computer meaningless. This is why weather predictions can often 'see' only a week or so into the future.

Luckily short-term prediction remains feasible, and is why a significant chunk of the world's computational and remote-sensing resources are concerned with meteorology. More accurate predictions of short-term extreme weather events, like cloudbursts, translate to more effective alerts and response systems that can save lives.

How, then, are we to approach the mercurial beast called Turbulence whose behaviour eludes prediction? Should we abandon all hopes of a simple theory to explain it, without feedback loops and endless vortices?

There are some glimmers of hope. The details of a turbulent flow remain unpredictable, but we know that the averages of some properties of a flow over time, like mean velocity in a pipe or total lift force on an aeroplane, are well-behaved (which is a mathematician's way of saying they don't cause one to rip out one's hair). This is how, for example, we know climate change is real: its mechanisms display a lot of variability, but when we study a long-time average of the weather, some trends become clear.

The challenge lies in predicting the values of these quantities that scientists have measured in experiments without having to fully solve the Navier-Stokes equations.

Another glimmer of hope is the presence of order in the chaos. A celebrated example of order in turbulence is the relationship between the size and energy of a turbulent eddy. The Russian physicist Andrei Kolmogorov proposed that the ratio of the swirling velocities of any two eddies is entirely determined by their typical sizes. So the ratio of the velocities of an eddy 10 km and another 1 km wide would be the same as that for two eddies 10 metres and 1 metre wide.

This simple idea has fascinated scientists. How could this relationship hold for a variety of flows – including air churning amid clouds, water flowing through a kitchen faucet, smoke rising from a stove? Yet both experiments and computer simulations have backed up Kolmogorov's prediction well.

(There is a caveat, however: Kolmogorov's theory didn't account for the fact that, once in a long while, turbulence produces some small but very strong eddies. These bursts of motion are intense enough to cause the system to deviate from Kolmogorov's theory. Such bursty behaviour is called intermittency and remains a subject of ongoing research.)

Another striking feature of order in turbulent flows is that they often contain pockets of coherent motion. A striking example is the Great Red Spot in Jupiter's atmosphere. The spot is really an anticyclonic storm three-times as wide as the earth, churning for at least 190 years. How can such a coherent structure arise spontaneously and then survive in the presence of so much turbulence?

Such possibilities speak to the fact that turbulence is far from a random process. Instead, it hides a deep level of organisation that we are yet to uncover.

This is why turbulence continues to attract and challenge scientists from across disciplines, while providing a reminder that profound mysteries of nature are not the sole province of massive particle colliders or giant telescopes. One could be churning right under your nose.

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GAME-CHANGER: THE HINDU EDITORIAL ON APPROVAL FOR GENE THERAPY TO TREAT SICKLE CELL DISEASE AND BETA THALASSEMIA

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

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Less than a month after the U.K. drug regulator approved Casgevy, the gene therapy to treat people above 12 with sickle cell disease and beta thalassemia, the U.S. FDA has approved two gene therapies — Casgevy and Lyfgenia — to treat sickle cell disease in patients over 12. Its decision on approving Casgevy gene therapy for treating beta thalassemia is expected by March 2024. These landmark decisions mark the beginning of gene therapy using the CRISPR-Cas9 tool to treat diseases that could otherwise be cured only through bone marrow transplantation. While Lyfgenia uses a disabled lentivirus as a vector to introduce into the blood stem cells a new gene for haemoglobin that mimics the healthy version, Casgevy uses the gene-editing tool of CRISPR-Cas9 to disable a particular gene (BCL11A) that turns off foetal haemoglobin production in blood stem cells. While about 10% of adults continue to produce foetal haemoglobin, in others, the BCL11A gene prevents the production of foetal haemoglobin. By disabling the BCL11A gene, foetal haemoglobin that is produced, which does not have the abnormalities of adult haemoglobin, helps treat patients with sickle-cell disease or beta thalassaemia. In clinical trials, 28 of 29 sickle-cell disease patients who received Casgevy gene therapy were relieved of the debilitating effects of the disease for a year; for beta thalassaemia, 39 of 42 patients did not require blood transfusion for one year, and in the remaining three the need for blood transfusion reduced by more than 70%. In the case of clinical trials involving Lyfgenia, 30 of 32 sickle cell disease patients did not suffer from severe blocked blood flow caused by sickle cells, while 28 of 32 patients did not experience any blocked blood flow events six to 18 months post-infusion.

Since both gene therapies use patients' own blood cells for gene editing, the number of patients who can potentially be treated will be huge as these treatments do not rely on matching bone marrow donors. But in reality, these treatments would be exorbitantly expensive. Also, much like bone marrow transplantation, only certain hospitals will be equipped to extract a patient's blood stem cells and use the genetic editing tool to the stem cells before reinjecting them, thus limiting the number of beneficiaries. With clinical trials evaluating the therapies in a very small number of patients and for shorter duration, the compulsion to continuously monitor their safety and efficacy through real world data cannot be overemphasised: the possibility of unintended genetic modifications and their resultant side effects are real when the CRISPR–Cas9 tool is used.

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POPE, ONCE A VICTIM OF AI-GENERATED IMAGERY, CALLS FOR TREATY TO REGULATE ARTIFICIAL INTELLIGENCE

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Pope, once a victim of AI-generated imagery, calls for treaty. | Photo Credit: REUTERS

Pope Francis on Thursday called for an international treaty to ensure artificial intelligence is developed and used ethically, arguing that the risks of technology lacking human values of compassion, mercy, morality and forgiveness are too great.

Francis added his voice to increasing calls for binding, global regulation of AI in his annual message for the World Day of Peace, which the Catholic Church celebrates each Jan. 1. The Vatican released the text of the message on Thursday.

For Francis, the appeal is somewhat personal: Earlier this year, an AI-generated image of him wearing a luxury white puffer jacket went viral, showing just how quickly realistic deepfake imagery can spread online.

The pope's message was released just days after European Union negotiators secured provisional approval on the world's first comprehensive AI rules that are expected to serve as a gold standard for governments considering their own regulation.

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Artificial intelligence has captured world attention over the past year thanks to breathtaking advances by cutting-edge systems like OpenAI's ChatGPT that have dazzled users with the ability to produce human-like text, photos and songs. But the technology has also raised fears about the risks the rapidly developing technology poses to jobs, privacy and copyright protection and even human life itself.

Francis acknowledged the promise AI offers and praised technological advances as a manifestation of the creativity of human intelligence, echoing the message the Vatican delivered at this year's U.N. General Assembly where a host of world leaders raised the promise and perils of the technology.

But his new peace message went further and emphasized the grave, existential concerns that

have been raised by ethicists and human rights advocates about the technology that promises to transform everyday life in ways that can disrupt everything from democratic elections to art.

"Artificial intelligence may well represent the highest-stakes gamble of our future," said Cardinal Michael Czerny of the Vatican's development office, who introduced the message at a press conference Thursday. "If it turns out badly, humanity is to blame."

The document insisted that the technological development and deployment of AI must keep foremost concerns about guaranteeing fundamental human rights, promoting peace and guarding against disinformation, discrimination and distortion.

Francis' greatest alarm was devoted to the use of AI in the armaments sector, which has been a frequent focus of the Jesuit pope who has called even traditional weapons makers "merchants of death."

He noted that remote weapons systems had already led to a "distancing from the immense tragedy of war and a lessened perception of the devastation caused by those weapons systems and the burden of responsibility for their use."

"The unique capacity for moral judgment and ethical decision-making is more than a complex collection of algorithms, and that capacity cannot be reduced to programming a machine," he wrote.

He called for "adequate, meaningful and consistent" human oversight of Lethal Autonomous Weapons Systems (or LAWS), arguing that the world has no need for new technologies that merely "end up promoting the folly of war."

On a more basic level, he warned about the profound repercussions on humanity of automated systems that rank citizens or categorize them. In addition to the threats to jobs around the world that can be done by robots, Francis noted that such technology could determine the reliability of an applicant for a mortgage, the right of a migrant to receive political asylum or the chance of reoffending by someone previously convicted of a crime.

"Algorithms must not be allowed to determine how we understand human rights, to set aside the essential human values of compassion, mercy and forgiveness, or to eliminate the possibility of an individual changing and leaving his or her past behind," he wrote.

For Francis, the issue hits at some of his priorities as pope to denounce social injustices, advocate for migrants and minister to prisoners and those on the margins of society.

The pope's message didn't delve into details of a possible binding treaty other than to say it must be negotiated at a global level, to both promote best practices and prevent harmful ones. Technology companies alone cannot be trusted to regulate themselves, he said.

He repurposed arguments he has used before to denounce multinationals that have ravaged Earth's national resources and impoverished the Indigenous peoples who live off them.

Freedom and peaceful coexistence are threatened "whenever human beings yield to the temptation to selfishness, self-interest, the desire for profit and the thirst for power," he wrote.

Barbara Caputo, professor at the Turin Polytechnic university's Artificial Intelligence Hub, noted that there was already convergence on some fundamental ethical issues and definitions in both the EU's regulation and the executive order unveiled by U.S. President Joe Biden in October.

"This is no small thing," she told the Vatican briefing. "This means that whoever wants to produce artificial intelligence, there is a common regulatory base."

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'AUTHENTICITY' IN A POST-AUTHENTIC WORLD

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'The lines separating truth from falsehood, right from wrong, love and hate, and war and attack, are becoming more and more hazy in this post-truth era' | Photo Credit: Getty Images

Merriam-Webster's word of the year for 2023 is "authentic", which is a fitting follow-up to their word of the year choice for 2022, "gaslighting," a term for deceiving someone into doubting their own realities or beliefs.

"To thine own self be true." Polonius's remarks in Hamlet serve as a constant reminder to examine ourselves. However, according to Merriam-Webster, "when we question authenticity, we value it even more." Honestly, yes. These days, every bit of our lifestyle is Artificial Intelligence (AI)-driven; deep fakes and post-truths have blurred the boundary between "real" and "fake." Authenticity gets prominence as Elon Musk believes that individuals should be more "authentic" on social media, and celebrities such as Taylor Swift strive for "authentic voice" and "authentic self". But is that horizon of "authenticity"? While it is a desirable quality, what does the term "authentic" really describe? Being true to one's own personality, spirit, or character? Not false or imitation? Made or done in the same way as an original?

Over time, the mechanism of authenticity evolved. Although Rousseau maintained that the need for others' approval undermines authenticity, Sartre and Heidegger acknowledged that external influences are unavoidable and that society and the natural world shape us just as much as our own choices. Therefore, "authenticity" in today's world ought to be entwined with celebrity culture, identity, and social media, along with AI and its deep fake avatar. It is also bound to be closely related to "fake news", which surfaced out of nowhere in November 2016. Even though former U.S. President Donald Trump relentlessly bashed the media as "fake news", Merriam-Webster states that its origins date back to the 1890s. Mussolini even distributed a manipulated photo of himself to the general population.

Is "authenticity" the plague of the 21st century? What has transpired is that because of constantly advancing technology, it is now easier, less expensive, and quicker to produce and distribute fake contents. It even raises the question of whether Mr. Trump was key in creating the post-truth world. Or whether he was merely one of post-truth's greatest products during its formative stages. The barrier, however, has now been breached by generative AI; the horizon has been expanded further.

Today's AI avatars are able to create realistic-looking opinion page articles, fiction, paintings,

and even research papers. After admitting that AI was used to create a prize-winning photograph, German photographer Boris Eldagsen declined the Sony World Photography Award in April, stating that he was curious to find out if contests were ready for AI photos to enter. Evidently, they were not.

We witness an AI-generated image of Pope Francis donning a stylish puffer jacket, unsettling deep fakes of well-known actors, and potentially harmful audio or video clips amid important elections. Due to social media's magical ability, they quickly reach millions and are capable of orchestrating irreversible damage before being identified as fake and debunked. Furthermore, we would never know the exact number of unidentified "fake" news stories, articles, images, audio or video clips, and research papers. The shade of uncertainty widens.

According to AI scientist Nina Schick, "Infocalypse", the biggest information and communications crisis in world history, is imminent. Further, the boundary between mainstream and social media is getting blurred. For instance, in October, the fake news of Amartya Sen's passing swept the media, originating with a post on social media.

Have we slipped down the rabbit hole of AI and social media and into the era of post-authenticity? "Trust," however, is the biggest casualty in effect. In his 2021 book of the same name, journalist Michael Grothaus described how society is transforming into a place where we would "Trust No One".

Today, anyone may cast a doubt on anything by just publicly doubting its authenticity, regardless of how real it is. It helps the bad actors; in 2018, American law professors Bobby Chesney and Danielle Citron popularised the phrase "liar's dividend". The greatest risk to mankind is that we might soon cease to take anything at face value.

Because of AI's presumed ability to create seemingly convincing text and data, researchers and journal editors are becoming increasingly concerned about integrity. Allegations of falsified or wrong data on various topics important to the common people, such as GDP, employment, inflation, and COVID-19-related statistics, frequently rock different societies. With the AI boom, the falsification of data and text could evolve into a new realm in this post-authentic age.

The lines separating truth from falsehood, right from wrong, love and hate, and war and peace, are becoming more and more hazy in this post-truth era. We understand that "authenticity", which is inherently like an honest "performance", remains elusive because fake news's post-authenticity is a social issue that is a sign of waning "trust" in a common civic endeavour rather than a purely technological or media problem. Technology's glitter is not helping society either.

But we still strive for authenticity and an illuminating, trustworthy future for mankind, even when it seems like we are heading towards a dystopian future in which we would "Trust No One". Sadly.

Atanu Biswas is Professor of Statistics, Indian Statistical Institute, Kolkata

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THREE-DAY GPAI SUMMIT CONCLUDED TODAY AT BHARAT MANDAPAM!

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

India, the Chair of the Global Partnership on Artificial Intelligence (GPAI), successfully hosted the GPAI Summit from December 12 - 14, 2023, at the Bharat Mandapam in New Delhi. Over the past three days, around 30 sessions were organized, which were graced by the global AI experts from GPAI, International Organisations, Industry / Startups, and Academia. Some of these sessions were held in closed door meetings having delegates and experts of GPAI. Other sessions were held in public and live streamed for the wider participation. More than 22,000 persons attended the summit and out of these 15,000+ AI enthusiasts participated in the summit virtually.

The major outcomes achieved during the GPAI summit are as follows:

1. GPAI New Delhi Declaration built the consensus among GPAI members on advancing safe, secure, and trustworthy AI and commitment to supporting the sustainability of GPAI projects.

2. The Prime Minister's gave clarion call to work together to prepare a global framework for the ethical use of AI".

3. India as the main player in the field of AI talent and AI-related ideas was highlighted.

4. India Shines as Global Hub for AI Innovation.

5. India brought together all major initiatives for AI – UN Advisory Group on AI, UK AI Safety Summit – at one event at GPAI New Delhi Summit.

6. AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT) and National Program on Artificial Intelligence and its role in shaping AI ecosystem in India was prominently emphasized.

7. Platform was provided to the research community to showcase their core and applied research.

8. Opportunity was provided to Startup community to showcase their AI products and services in the expo.

9. AI Pitch fest provided an opportunity to upcoming startups to pitch for their innovation and value-added products and services.

10. The summit brought to the fore the multi-stakeholder approach on taking AI among the masses especially among youths and students and highlighted the latest advancements on AI from technology, policy, framework, industrial, ethical, business, and academic perspectives.

The day-wise glimpse of major activities are as follows: -

Glimpse of major activities on Day 1 – December 12, 2023

Inaugural Session

The GPAI summit was inaugurated on December 12, 2023 by Prime Minister of India, Shri Narendra Modi, in the august presence of Union Minister of Electronics and IT, Railways, and Communications, Shri Ashwini Vaishnaw; Union MoS for Electronics and IT, Skill Development, & Entrepreneurship and Jal Shakti, Shri Rajeev Chandrasekhar; Outgoing chair of GPAI & Vice Minister for Policy Coordination, Internal Affairs and Communications, Mr Hiroshi Yoshida; and Secretary, Ministry of Electronics and IT, Shri S Krishnan. The event saw the participation of delegates from 29 member countries & various international organisations namely OECD, UNESCO, ISO, WEF, World Bank, UNDP, Commonwealth etc, GPAI experts, industry and startup veterans, AI practitioners, academicians, students, and officials from Central and State Governments.

Addressing the gathering, the Prime Minister expressed delight in India chairing the GPAI Summit next year at a time when the entire world is debating artificial intelligence. Noting both the positive and negative aspects emerging, the Prime Minister underlined the responsibility enshrined in each nation and recalled interactions with various industry leaders of AI, discussing the GPAI Summit. He stated that AI has had an impact on every country, big or small, and suggested moving forward with caution. The Prime Minister informed about initiative National Program on Artificial Intelligence, AIRAWAT, and the soon-to-be-launched AI Mission, which aims to establish the computing powers of AI. This, the Prime Minister said, will provide better services to startups and innovators in India and also promote AI applications in the sectors of agriculture, healthcare, and education. The Prime Minister expressed confidence that the GPAI Summit will prove to be an excellent opportunity for the exchange of ideas and a great learning experience for every delegate, and the outcomes when implemented, will definitely pave the way for building a responsible and sustainable future.

Shri Ashwini Vaishnaw, MeitY, Railways & Communications, in his address, shared his thoughts on using technology to serve citizens in native languages, imparting personalized learning experiences to students, rendering healthcare accessible through AI-powered diagnostics, and optimizing yield and resource management via precision agriculture techniques. In his address, Shri Rajeev Chandrasekhar, MoS for E&IT, touched on the insights about India's strides in the AI sector. He expressed, "India under Prime Minister Narendra Modi Ji's leadership is all in for emerging technologies and is committed to exploiting AI to ensure advancements in healthcare, agriculture, language translation, and many other real-life use cases, as a natural expansion of an India-DPI framework of solutions." Mr Hiroshi Yoshida, Minister of the Outgoing Chair of GPAI, extended heartfelt congratulations to the Government of India for hosting the GPAI Summit and remarked that "AI technology has undergone rapid evolution this year, witnessing remarkable progress and the pervasive proliferation of generative AI across society. Given technology's universal impact, AI governance necessitates deliberation through a multi-stakeholder approach." The Prime Minister also took a walk-through of the Global AI Expo, wherein, AI products and services were showcased by 100+ AI Startups.

Panel Discussions and other sessions of day 1 – December 12, 2023

Session titled 'Applications of AI in Priority Sectors' focused on the challenges and opportunities in the adoption of AI by industries to enhance competitiveness, explore the market potential of AI, and promote its uptake across sectors. Keynote speakers included Mr. Vijay Shekhar Sharma, CEO of Paytm, and Ms. Nivruti Rai, MD & CEO of Invest India. The session was moderated by Mr. Kazim Rizvi, Founder of The Dialogue, and speakers included Ms. Laila Cremona, Founder & CEO of The Medibay, Mr. Aakrit Vaish, CEO of Haptik AI, Mr. Samir Shah, Executive Vice Chair and Co-Founder of Dvara, Mr. Narayanan Vaidyanathan, Head of Policy Development at the Association of Chartered Certified Accountants (ACCA), Dr. Shailesh

Kumar, Professor at Jio Institute, Mr. Raghu Dharmaraju, CEO of ARTPARK at IISc, and Mr. David Weller, Senior Director of Emerging Technologies, Competitiveness, and Sustainable Policy at Google.

Session on the 'Responsible AI Working Group' has experts namely Sophie Fallaha, Executive Director of CEIMIA, Michael O'Sullivan, GPAI Project co-lead for Pandemic Resilience and Associate Professor in the Department of Engineering Science at the University of Auckland, Amir Banifatemi, GPAI Project co-lead for Scaling Responsible AI Solutions and Co-Founder and Director at AI Commons, Juan David Gutiérrez, GPAI Project co-lead for Sandbox and Associate Professor at Universidad de los Andes, Aditya Mohan, GPAI Project co-lead for the sandbox and National Standards Authority of Ireland, Nicolas Miailhe, GPAI co-lead for RAISE - Founder and President of The Future Society, Lee Tiedrich, GPAI Project co-lead for RAISE - Duke University, Raja Chatila, Professor Emeritus of Artificial Intelligence, Robotics and IT Ethics, Sorbonne University, Catherine Regis, Professor, Faculty of Law, University of Montreal and Alistair Knott, GPAI Project co-lead for Social Media Governance - University of Victoria.

Sessions on topic Collaborative AI for Global Partnership (CAIGP) - Global Cooperation for Equitable AI & Building Scalable Large Language Models (LLMs) was organised, wherein, distinguished panelists delved into the intricate aspects of establishing a seamless foundation technology for crafting speech recognition tailored for Indian languages. The significance of multicultural training data and multilingual evaluation data was duly underscored. The unswerving commitment to democratizing AI and expanding its accessibility to the widest possible audience remained a paramount priority. In cognizance of the imperative for multilingual models, Bhashini, developed indigenously in India, stands as a testament to inclusivity and is currently being seamlessly integrated across diverse applications within the nation.

Session 'AI and Global Health: Role of AI In Advancing Healthcare' featured Dr. Ricardo Baptista Leite, CEO of Health AI, and Dr. VK Paul, Member of NITI Aayog, as keynote speakers. Panellists included Mr. Sameer Kanwar, Director of Digital Health for India & South Asia at PATH, Mr. Girish Raghavan, VP of Engineering at GE Healthcare, Dr. Geetha Manjunath,

Founder of Niramai, and Mr. Kiran Anandampillai, CEO and Founder of i-Drishti.

Research symposium, graced by the presence of 17 erudite speakers, conducted profound deliberations on the challenges encountered in the deployment of AI, encompassing concerns such as misuse, threats to research integrity, the complexity of machine learning models, and ethical considerations entailing potential negative impacts on individuals and society. Discussions further probed into nuanced subjects like bias, fairness, privacy, transparency, and accountability. The emergence of responsible AI emerged as a pivotal focus, emphasizing ethical, transparent, and trustworthy AI development.

Glimpse of major activities on Day 2 – December 13, 2023

Session titled "AI Education and Skilling: Bridging the Talent Gap" was graced by luminaries namely Mr. Gokul Subramaniam, Intel India President & Vice President Client Computing Group, and Dr. Mariagrazia Squicciarini, Chief of Executive Office, Social and Human Sciences Sector, UNESCO, serving as keynote speakers, accompanied by 10 other influential voices from organizations like NSDC, EXL, Dell, and NASSCOM. The panels discussed at length the potential of AI through both augmentation and automation. They underscored that education fulfills its purpose only when aligned with the workplace, emphasizing the pivotal role of the National Education Policy (NEP) as a game-changer, introducing flexibility, entry and exit options, and vocational courses from grade 6. Panellists advocated for closer industry-academic collaboration in the education sector and urged for the inclusion of students' voices in AI panels, as they are the torchbearers of the future.

Session "International AI Regulations: Catalyzing Innovation while ensuring Safety, Trust, and Accountability" featured H.E. Amandeep Singh Gill, Under-Secretary-General, Envoy on Technology, United Nations, as the keynote speaker. Dignitaries from Google, OECD, Microsoft, TechUK, Girl Hype Women Who Code, and the Council of Europe Committee on AI engaged in a dynamic discussion on the Human-Centric Deployment Framework. The urgency to regulate AI within the next six months to address evolving technologies and potential risks echoed through the session.

An AI Pitch Fest was organised, where a distinguished jury evaluated 10 pitches covering diverse topics, including Repositories of public algorithms, Global impact of scalable and safe responsible AI solutions, and AI's Impact on Latin America's workers, among others. The pitch fest showcased groundbreaking ideas and also ignited hope for a brighter future driven by the enthusiasm of the younger generation.

A Fireside Chat on the Government's Vision and Role in ensuring a Safe & Trusted Artificial Intelligence unfolded, featuring Shri. Rajeev Chandrasekhar, Hon'ble MoS, Electronics & IT, Skill Development & Entrepreneurship, and Jal Shakti, GoI, Mr. Viscount Camrose, Minister for Artificial Intelligence and Intellectual Property, United Kingdom, and Mr. Hiroshi Yoshida, Vice Minister for Policy Coordination, Ministry of Internal Affairs and Communications, Japan. Moderated by Shri. Sriram Raghavan, Vice President, IBM Research AI, the chat delved into a spectrum of future-related discussions on AI. The panel, emphasized the complexity of computation, stressing that substantial investments are imperative for the research sector. A powerful proposition echoed through the hall—the establishment of a Sandbox environment, contingent upon the bedrock of trust. The conclusion resonated with the conviction that public trust and acceptance of AI act as catalysts, propelling a cascade of advancements in the realm.

Session, 'Mitigating Social Risks for a Safe and Resilient Society,' was graced by Ms. Gabriela Ramos, Assistant Director-General (ADG) for Social and Human Sciences, UNESCO, as the keynote speaker. The stage was adorned with eminent professors in the field of AI, including

Prof. Joanna Bryson, Professor of Ethics & Technology, Hertie School Centre for Digital Governance, Prof. Ajay Kumar Sood, Principal Scientific Advisor, Government of India, and Prof. David Leslie, Director of Ethics and Responsible Innovation Research at the Alan Turing Institute, alongside other dignitaries. In a riveting exchange, the luminaries dissected the pivotal role of Responsible AI models in preventing adverse outcomes, particularly for marginalized populations. Transcending theory, the deliberations offered actionable strategies to operationalize frameworks. The goal was clear—foster a society resilient to the impact of AI, ensuring safety and inclusivity in the decades to come

Session on Productization and Scaling-up of AI Solutions had an illustrious panel, featuring luminaries such as Dr. Swami Sivasubramanian, Vice President, Data and AI, AWS, and Mr. Sriram Raghavan, Vice President, IBM Research AI. With fervour, the panel explored the untapped potential of generative AI, unravelling strategies to drive innovation, promote education, and accelerate adoption. The discussion ventured into the transformative power of translating AI innovations into solutions for the Global South, with a spotlight on how Large Language Models (LLMs) could bridge the gap in human capacity for serving the needs of underserved communities.

Session on Harnessing the power of Data Responsibly had expert panelists namely, Mr. Amit Agrawal, CEO of UIDAI, professors from France and West Africa, delegates from the US and Singapore, and the brains behind iSpirt Foundation and CivicDataLab gathered for the discussion. They talked about breaking down barriers set up by big data players, sharing data more openly, and working together. They also stressed the need for open talks, stopping unfair contracts, and making sure different services can work together. The conversation also touched on finding the right balance between keeping things in check and letting new ideas grow. They shared ideas on how to bring laws into the world of technology for responsible data use.

29 countries of the GPAI have unanimously adopted the GPAI New Delhi Declaration, which promises to position GPAI at the front and center of shaping the future of AI in terms of both innovation and creating collaborative AI between the partner nations. Countries agreed to create applications of AI in healthcare, agriculture, and many other areas that concern all our countries and all of our people.

Glimpse of major activities on Day 3 – December 13, 2023

Session titled "Data Governance Working Group" featured the co-chair of the working group, Ms. Maja Bogataj Jancic, and GPAI Project leads including Ms. Jhakak Kakkar, Ms. Ching-Yi Liu, Mr. Shameek Kundu, Mr. Thomas Nkoudou, Ms. Alison Gilwald, and Ms. Sophie Fallaha, Executive Director, CEIMIA. Prof. Christiane Wenderhorst and Ms. Kyoko Yoshinaga participated virtually. The panel deliberated on establishing a framework for data justice, bridging the gap between research and practice, and incorporating considerations of social and economic justice in the utilization of data for AI development.

Session on "AI for Climate Action: Accelerating Sustainable Solutions" took place with Mr. Vilas Dhar, Keynote, President and Trustee, Patrick J. McGovern Foundation, as the keynote speaker, alongside luminaries from IIT Bombay, UNDP, CivicDataLab, and others. The panel emphasized aligning agriculture with climate change and climate-resilient goals, advocating for localized AI-based solutions in agriculture, and recognizing GPAI's potential as a convenor to unite experts to address AI and climate-related challenges.

Session on "Generative AI: Issues & Challenges" featured representation from ITIC, Intel, Microsoft, Google, ILO, Professors from the University of Illinois, and the University of Wellington, as well as co-founders of Stealth and Sarvam AI startups. The panel discussed the

paramount importance of ethical development in AI advancement, recognizing AI's transformative potential in healthcare, agriculture, and economic growth. The discussion also highlighted India's linguistic diversity, emphasizing the need for AI-Language Model Models (LLMs) and the applicability of G7 principles in establishing risk-based AI principles. The positive impacts of Gen AI in healthcare, agriculture, and other sectors were also underscored.

AI Gamechanger awards ceremony was graced by the distinguished jury, including Sh. S. Krishnan, Secretary, Ministry of Electronics and IT, Sh. Abhishek Singh, Additional Secretary, Ministry of Electronics and IT, Ms. Inma Martinez, Multistakeholder Expert Group Chair, GPAI, Mr. Howard Lakougna, Senior Program Officer, Bill and Melinda Gates Foundation, Mr. Arpit Agarwal, Partner, Blume Ventures, Ms. Pankaj Thakar, Founder & Chief Mentor, PadUp Ventures, and Mr. Anirudh Suri, Managing Partner, India Internet Fund, recognized and applauded the efforts of 10 shortlisted candidates who demonstrated exemplary Responsible AI solutions, shortlisting 6 for the awards.

Session on "Innovation and Commercialization Working Group" featured 8 I&C experts, namely Kaitlyn Bove, Françoise Soulié, Laurence Liew, Ingo Hoffmann, Lee Tiedrich, Yann Dietrich, Inma Martinez, and Robert Kroplewski. The panel discussed and concluded that innovation and regulation should be considered while designing AI solutions, and intellectual property and contractual terms related to AI should be taken into consideration in designing AI solutions and systems.

Session titled "AI and Intellectual Property: Protecting Innovation" was graced by Hon'ble Justice Pratibha Singh, Judge, High Court of Delhi, as the keynote speaker, alongside 9 distinguished speakers from law firms and law schools. The panellists delved into topics such as DABUS - The device for the autonomous Bootstrapping of unified sentience, copyright and patent of AI creations, the future of AI & IP, and emphasized the careful consideration needed for the implications of AI innovation, especially in generative AI.

Session titled 'Safe and Trustworthy AI: Adopting Robustness and Security in AI Systems' was led by Debjani Ghosh, President, NASSCOM, as the keynote speaker and luminaries from MasterCard, CERT-IN, IBM, and others, engaged in an intellectual exchange on how Gen AI can be harnessed to create even more sophisticated defense systems. The discussion covered topics such as identifying threats faster, predicting attack behavior, and automatically deploying countermeasures. The consideration of using AI for securing AI systems also emerged as a significant aspect to ponder. The session delved into the challenge of synergizing conflicting principles in the implementation and deployment of AI.

Session titled 'AI for All – Bridging the Global AI Divide,' had Hon. Neema Lugangira, Member of Parliament, Tanzania; Chair, African Parliamentary Network on Internet Governance, and Shri S. Krishnan, Secretary, MeitY, as keynote speakers. The digital revolution, particularly with AI, was likened to the industrial revolution, and leveraging history was emphasized as a means to establish a more democratic and equitable decision-making setup. The disparities between regions were acknowledged, emphasizing the need to address them. Creating inclusive environments was deemed vital for obtaining authentic AI data, and the session highlighted that skilled researchers and improved infrastructure are crucial for achieving high-quality outcomes in AI technology

'Fireside Chat: Government's Strategy in Supporting a Vibrant Startup Ecosystem for AI' was held between founders of leading startups in India, namely Karya, Areete, Co-rover, NAYAN Technologies, Qure.ai, Haptik.ai, and Kissan AI. The discussion was moderated by Mr. Pankaj Doval, National Editor, Times of India. The panellists concluded that India's AI strategy adopts a multifaceted approach aimed at positioning the country as a global leader in artificial intelligence.

This approach includes establishing research centers, capacity building, promoting AI literacy, ensuring data interoperability, and developing legal frameworks. The discussion emphasized the importance of building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. Additionally, it underscored the need to consider intellectual property laws, particularly patent laws, to facilitate innovation and align with the Sustainable Development Goal of building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation

Closing Ceremony

The summit concluded with the closing ceremony, which was graced by Mr. S Krishnan, Secretary, Ministry of Electronics and Information Technology, Government of India and Mr. Abhishek Singh, Additional Secretary, Ministry of Electronics and Information Technology and President and CEO, National E-Governance Division, Government of India. The context setting was done by Ms. Kavita Bhatia, Group Coordinator & Scientist G, MeitY. Mr. Abhishek Singh, in his address, summarised the activities carried over the last 3 days and stressed on the multi-stakeholder approach on AI. Mr. S. Krishnan, in his addressed, thanked the participants and stressed on the outcomes and utility of the summit for driving AI ecosystem. The winners of AI Gamechangers Awards and YUVAi - Youth for Unnati & Vikas with AI Awards (organised by Intel in partnership with NeGD) were also felicitated during the closing ceremony.

The detailed information on the summit is made available at https://gpaidelhi2023.indiaai.gov.in/ . The portal also features an AI-enabled chatbot for answering visitor queries. The information was also made available on an AI enabled Chatbot on Whatsapp on number +91-9319613105 or on https://wa.me/919319613105?text=Hi.

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DK/DK/SMP

India, the Chair of the Global Partnership on Artificial Intelligence (GPAI), successfully hosted

the GPAI Summit from December 12 - 14, 2023, at the Bharat Mandapam in New Delhi. Over the past three days, around 30 sessions were organized, which were graced by the global AI experts from GPAI, International Organisations, Industry / Startups, and Academia. Some of these sessions were held in closed door meetings having delegates and experts of GPAI. Other sessions were held in public and live streamed for the wider participation. More than 22,000 persons attended the summit and out of these 15,000+ AI enthusiasts participated in the summit virtually.

The major outcomes achieved during the GPAI summit are as follows:

1. GPAI New Delhi Declaration built the consensus among GPAI members on advancing safe, secure, and trustworthy AI and commitment to supporting the sustainability of GPAI projects.

2. The Prime Minister's gave clarion call to work together to prepare a global framework for the ethical use of AI".

3. India as the main player in the field of AI talent and AI-related ideas was highlighted.

4. India Shines as Global Hub for AI Innovation.

5. India brought together all major initiatives for AI – UN Advisory Group on AI, UK AI Safety Summit – at one event at GPAI New Delhi Summit.

6. AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT) and National Program on Artificial Intelligence and its role in shaping AI ecosystem in India was prominently emphasized.

7. Platform was provided to the research community to showcase their core and applied research.

8. Opportunity was provided to Startup community to showcase their AI products and services in the expo.

9. AI Pitch fest provided an opportunity to upcoming startups to pitch for their innovation and value-added products and services.

10. The summit brought to the fore the multi-stakeholder approach on taking AI among the masses especially among youths and students and highlighted the latest advancements on AI from technology, policy, framework, industrial, ethical, business, and academic perspectives.

The day-wise glimpse of major activities are as follows: -

Glimpse of major activities on Day 1 – December 12, 2023

Inaugural Session

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UNESCO, ISO, WEF, World Bank, UNDP, Commonwealth etc, GPAI experts, industry and startup veterans, AI practitioners, academicians, students, and officials from Central and State Governments.

Addressing the gathering, the Prime Minister expressed delight in India chairing the GPAI Summit next year at a time when the entire world is debating artificial intelligence. Noting both the positive and negative aspects emerging, the Prime Minister underlined the responsibility enshrined in each nation and recalled interactions with various industry leaders of AI, discussing the GPAI Summit. He stated that AI has had an impact on every country, big or small, and suggested moving forward with caution. The Prime Minister informed about initiative National Program on Artificial Intelligence, AIRAWAT, and the soon-to-be-launched AI Mission, which aims to establish the computing powers of AI. This, the Prime Minister said, will provide better services to startups and innovators in India and also promote AI applications in the sectors of agriculture, healthcare, and education. The Prime Minister expressed confidence that the GPAI Summit will prove to be an excellent opportunity for the exchange of ideas and a great learning experience for every delegate, and the outcomes when implemented, will definitely pave the way for building a responsible and sustainable future.

Shri Ashwini Vaishnaw, MeitY, Railways & Communications, in his address, shared his thoughts on using technology to serve citizens in native languages, imparting personalized learning experiences to students, rendering healthcare accessible through AI-powered diagnostics, and optimizing yield and resource management via precision agriculture techniques. In his address, Shri Rajeev Chandrasekhar, MoS for E&IT, touched on the insights about India's strides in the AI sector. He expressed, "India under Prime Minister Narendra Modi Ji's leadership is all in for emerging technologies and is committed to exploiting AI to ensure advancements in healthcare, agriculture, language translation, and many other real-life use cases, as a natural expansion of an India-DPI framework of solutions." Mr Hiroshi Yoshida, Minister of the Outgoing Chair of GPAI, extended heartfelt congratulations to the Government of India for hosting the GPAI Summit and remarked that "AI technology has undergone rapid evolution this year, witnessing remarkable progress and the pervasive proliferation of generative AI across society. Given technology's universal impact, AI governance necessitates deliberation through a multi-stakeholder approach." The Prime Minister also took a walk-through of the Global AI Expo, wherein, AI products and services were showcased by 100+ AI Startups.

Panel Discussions and other sessions of day 1 – December 12, 2023

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Session on the 'Responsible AI Working Group' has experts namely Sophie Fallaha, Executive Director of CEIMIA, Michael O'Sullivan, GPAI Project co-lead for Pandemic Resilience and Associate Professor in the Department of Engineering Science at the University of Auckland, Amir Banifatemi, GPAI Project co-lead for Scaling Responsible AI Solutions and Co-Founder and Director at AI Commons, Juan David Gutiérrez, GPAI Project co-lead for Sandbox and

Associate Professor at Universidad de los Andes, Aditya Mohan, GPAI Project co-lead for the sandbox and National Standards Authority of Ireland, Nicolas Miailhe, GPAI co-lead for RAISE - Founder and President of The Future Society, Lee Tiedrich, GPAI Project co-lead for RAISE - Duke University, Raja Chatila, Professor Emeritus of Artificial Intelligence, Robotics and IT Ethics, Sorbonne University, Catherine Regis, Professor, Faculty of Law, University of Montreal and Alistair Knott, GPAI Project co-lead for Social Media Governance - University of Victoria.

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Glimpse of major activities on Day 2 – December 13, 2023

Session titled "AI Education and Skilling: Bridging the Talent Gap" was graced by luminaries namely Mr. Gokul Subramaniam, Intel India President & Vice President Client Computing Group, and Dr. Mariagrazia Squicciarini, Chief of Executive Office, Social and Human Sciences Sector, UNESCO, serving as keynote speakers, accompanied by 10 other influential voices from organizations like NSDC, EXL, Dell, and NASSCOM. The panels discussed at length the potential of AI through both augmentation and automation. They underscored that education fulfills its purpose only when aligned with the workplace, emphasizing the pivotal role of the National Education Policy (NEP) as a game-changer, introducing flexibility, entry and exit options, and vocational courses from grade 6. Panellists advocated for closer industry-academic collaboration in the education sector and urged for the inclusion of students' voices in AI panels, as they are the torchbearers of the future.

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luminaries such as Dr. Swami Sivasubramanian, Vice President, Data and AI, AWS, and Mr. Sriram Raghavan, Vice President, IBM Research AI. With fervour, the panel explored the untapped potential of generative AI, unravelling strategies to drive innovation, promote education, and accelerate adoption. The discussion ventured into the transformative power of translating AI innovations into solutions for the Global South, with a spotlight on how Large Language Models (LLMs) could bridge the gap in human capacity for serving the needs of underserved communities.

Session on Harnessing the power of Data Responsibly had expert panelists namely, Mr. Amit Agrawal, CEO of UIDAI, professors from France and West Africa, delegates from the US and Singapore, and the brains behind iSpirt Foundation and CivicDataLab gathered for the discussion. They talked about breaking down barriers set up by big data players, sharing data more openly, and working together. They also stressed the need for open talks, stopping unfair contracts, and making sure different services can work together. The conversation also touched on finding the right balance between keeping things in check and letting new ideas grow. They shared ideas on how to bring laws into the world of technology for responsible data use.

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Glimpse of major activities on Day 3 – December 13, 2023

Session titled "Data Governance Working Group" featured the co-chair of the working group, Ms. Maja Bogataj Jancic, and GPAI Project leads including Ms. Jhakak Kakkar, Ms. Ching-Yi Liu, Mr. Shameek Kundu, Mr. Thomas Nkoudou, Ms. Alison Gilwald, and Ms. Sophie Fallaha, Executive Director, CEIMIA. Prof. Christiane Wenderhorst and Ms. Kyoko Yoshinaga participated virtually. The panel deliberated on establishing a framework for data justice, bridging the gap between research and practice, and incorporating considerations of social and economic justice in the utilization of data for AI development.

Session on "AI for Climate Action: Accelerating Sustainable Solutions" took place with Mr. Vilas Dhar, Keynote, President and Trustee, Patrick J. McGovern Foundation, as the keynote speaker, alongside luminaries from IIT Bombay, UNDP, CivicDataLab, and others. The panel emphasized aligning agriculture with climate change and climate-resilient goals, advocating for localized AI-based solutions in agriculture, and recognizing GPAI's potential as a convenor to unite experts to address AI and climate-related challenges.

Session on "Generative AI: Issues & Challenges" featured representation from ITIC, Intel, Microsoft, Google, ILO, Professors from the University of Illinois, and the University of Wellington, as well as co-founders of Stealth and Sarvam AI startups. The panel discussed the paramount importance of ethical development in AI advancement, recognizing AI's transformative potential in healthcare, agriculture, and economic growth. The discussion also highlighted India's linguistic diversity, emphasizing the need for AI-Language Model Models (LLMs) and the applicability of G7 principles in establishing risk-based AI principles. The positive impacts of Gen AI in healthcare, agriculture, and other sectors were also underscored.

AI Gamechanger awards ceremony was graced by the distinguished jury, including Sh. S. Krishnan, Secretary, Ministry of Electronics and IT, Sh. Abhishek Singh, Additional Secretary, Ministry of Electronics and IT, Ms. Inma Martinez, Multistakeholder Expert Group Chair, GPAI, Mr. Howard Lakougna, Senior Program Officer, Bill and Melinda Gates Foundation, Mr. Arpit

Agarwal, Partner, Blume Ventures, Ms. Pankaj Thakar, Founder & Chief Mentor, PadUp Ventures, and Mr. Anirudh Suri, Managing Partner, India Internet Fund, recognized and applauded the efforts of 10 shortlisted candidates who demonstrated exemplary Responsible AI solutions, shortlisting 6 for the awards.

Session on "Innovation and Commercialization Working Group" featured 8 I&C experts, namely Kaitlyn Bove, Françoise Soulié, Laurence Liew, Ingo Hoffmann, Lee Tiedrich, Yann Dietrich, Inma Martinez, and Robert Kroplewski. The panel discussed and concluded that innovation and regulation should be considered while designing AI solutions, and intellectual property and contractual terms related to AI should be taken into consideration in designing AI solutions and systems.

Session titled "AI and Intellectual Property: Protecting Innovation" was graced by Hon'ble Justice Pratibha Singh, Judge, High Court of Delhi, as the keynote speaker, alongside 9 distinguished speakers from law firms and law schools. The panellists delved into topics such as DABUS - The device for the autonomous Bootstrapping of unified sentience, copyright and patent of AI creations, the future of AI & IP, and emphasized the careful consideration needed for the implications of AI innovation, especially in generative AI.

Session titled 'Safe and Trustworthy AI: Adopting Robustness and Security in AI Systems' was led by Debjani Ghosh, President, NASSCOM, as the keynote speaker and luminaries from MasterCard, CERT-IN, IBM, and others, engaged in an intellectual exchange on how Gen AI can be harnessed to create even more sophisticated defense systems. The discussion covered topics such as identifying threats faster, predicting attack behavior, and automatically deploying countermeasures. The consideration of using AI for securing AI systems also emerged as a significant aspect to ponder. The session delved into the challenge of synergizing conflicting principles in the implementation and deployment of AI.

Session titled 'AI for All – Bridging the Global AI Divide,' had Hon. Neema Lugangira, Member of Parliament, Tanzania; Chair, African Parliamentary Network on Internet Governance, and Shri S. Krishnan, Secretary, MeitY, as keynote speakers. The digital revolution, particularly with AI, was likened to the industrial revolution, and leveraging history was emphasized as a means to establish a more democratic and equitable decision-making setup. The disparities between regions were acknowledged, emphasizing the need to address them. Creating inclusive environments was deemed vital for obtaining authentic AI data, and the session highlighted that skilled researchers and improved infrastructure are crucial for achieving high-quality outcomes in AI technology

'Fireside Chat: Government's Strategy in Supporting a Vibrant Startup Ecosystem for AI' was held between founders of leading startups in India, namely Karya, Areete, Co-rover, NAYAN Technologies, Qure.ai, Haptik.ai, and Kissan AI. The discussion was moderated by Mr. Pankaj Doval, National Editor, Times of India. The panellists concluded that India's AI strategy adopts a multifaceted approach aimed at positioning the country as a global leader in artificial intelligence. This approach includes establishing research centers, capacity building, promoting AI literacy, ensuring data interoperability, and developing legal frameworks. The discussion emphasized the importance of building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. Additionally, it underscored the need to consider intellectual property laws, particularly patent laws, to facilitate innovation and align with the Sustainable Development Goal of building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation

Closing Ceremony

The summit concluded with the closing ceremony, which was graced by Mr. S Krishnan, Secretary, Ministry of Electronics and Information Technology, Government of India and Mr. Abhishek Singh, Additional Secretary, Ministry of Electronics and Information Technology and President and CEO, National E-Governance Division, Government of India. The context setting was done by Ms. Kavita Bhatia, Group Coordinator & Scientist G, MeitY. Mr. Abhishek Singh, in his address, summarised the activities carried over the last 3 days and stressed on the multi-stakeholder approach on AI. Mr. S. Krishnan, in his addressed, thanked the participants and stressed on the outcomes and utility of the summit for driving AI ecosystem. The winners of AI Gamechangers Awards and YUVAi - Youth for Unnati & Vikas with AI Awards (organised by Intel in partnership with NeGD) were also felicitated during the closing ceremony.

The detailed information on the summit is made available at https://gpaidelhi2023.indiaai.gov.in/ . The portal also features an AI-enabled chatbot for answering visitor queries. The information was also made available on an AI enabled Chatbot on Whatsapp on number +91-9319613105 or on https://wa.me/919319613105?text=Hi.

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KAKRAPAR-4 NUCLEAR REACTOR ATTAINS CRITICALITY

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 17, 2023 06:32 pm | Updated 06:33 pm IST

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The third and fourth nuclear reactors with their containment domes (extreme left) at Kakrapar in Surat, Gujarat. Their cooling towers are visible. | Photo Credit: NPCIL

The fourth unit of the Kakrapar Atomic Power Project (KAPP-4) in Gujarat, with 700 MWe capacity, started controlled fission chain reaction and thus became critical at 1.17 am on December 17. Kakrapar is situated about 80 km from Surat.

The 700 MWe units are the largest indigenous nuclear power reactors to be built by the Nuclear Power Corporation of India Limited (NPCIL), a public sector undertaking of the Department of Atomic Energy.

The 700-MWe unit-3 of KAPP started generating commercial electricity from August 30.

These reactors are pressurised heavy water reactors (PHWRs), which use natural uranium as fuel and heavy water as coolant and moderator.

The NPCIL is already operating indigenous PHWRs with 220 MWe and 540 MWe capacity at other facilities.

The reactor's first criticality was ascertained after it met all the conditions set out by the Atomic Energy Regulatory Board (AERB), India's nuclear safety watchdog.

B.S. Pathak, Chairman and Managing Director of NPCIL, was present in the station's control room with the site team when KAPP-4 was commissioned, per an NPCIL press release. He congratulated the NPCIL employees and called the criticality of KAPP-4, happening within six months of commercial operation of unit-3, a significant achievement.

It demonstrated the strength of NPCIL in all facets of nuclear power generation – the design, construction, commissioning, and operation of reactors, Mr. Pathak said.

Indian industries supplied the equipment and executed the contract for these two reactors, according to the NPCIL press release. The Kakrapar Atomic Power Station already has two operating PHWRs with a capacity of 220 MWe each, called KAPS-1 and -2.

Earlier, on December 13, Mr. Pathak told *The Hindu* that the indigenously built 700 MWe reactors are among "the best reactors of this PHWR category". They have many advanced safety features, including among others a steel-lining from the floor to the wall and a passive decay heat removal system to cool the fuel core, he added.

The NPCIL presently operates 23 nuclear electricity reactors with a total capacity of 7,480 MWe. It has nine units, including KAPP-4, under construction while 10 more reactors, with a total capacity of 7,000 MWe, are in the pre-project phase.

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THE ERA OF CRISPR THERAPEUTICS IS HERE – WHAT CAN WE EXPECT?

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December 17, 2023 10:30 am | Updated 01:25 pm IST

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Representative photo. | Photo Credit: LJNovaScotia/pixabay

Imagine a future where genetic anomalies can be precisely targeted and corrected using genome editing – a giant leap from our ability to sequence or read human genomes two decades ago. The world of medicine is currently abuzz with news of regulatory agencies' approval for two highly anticipated CRISPR-based therapies for sickle-cell disease and -thalassaemia in the U.K. and the U.S.

The approval is groundbreaking because it augurs an era that could transform the lives of millions of patients and families grappling with these inherited blood disorders. To put this in perspective, more than a million people worldwide suffer from thalassemia, of whom 100,000 depend on regular blood transfusions. Another 20 million people around the world are estimated to be suffering from sickle-cell anaemia.

The discovery of the CRISPR system was the result of almost three decades of pure academic pursuit. Clustered regularly interspaced short palindromic repeats (CRISPR) are DNA elements that Spanish researchers discovered in archaea in 1993, and named and described later in a number of bacterial genomes.

These elements contain pieces of genetic material derived from viruses that infect bacteria (i.e. bacteriophages) and a set of proteins called Cas, or CRISPR-associated. Researchers tried to explain the elements' effect on antiviral immunity in 2005, but later found that CRISPR + Cas proteins could detect and prevent viral infections. That is, the two formed an antiviral defence system and helped bacteria 'acquire' resistance.

Then, in 2010, scientists demonstrated that CRISPR + specific proteins called Cas9 had the ability to cut double-stranded DNA at specific points. They also found the RNAs molecules that guided the Cas9 proteins to specific positions on a genome. And in 2012, researchers figured out a way to create synthetic RNA that could bind to Cas9 and guide it to a specific point on a DNA, where it could edit the DNA.

This pathbreaking work came from the labs of Emmanuelle Charpentier and Jennifer Doudna, and they were awarded the 2020 Nobel Prize in chemistry for it.

Virginijus Siksnys and his colleagues published similar work a few months later (despite having submitted it to the journal much earlier). This study also suggested that Cas9 could be targeted to specific genome locations by crispr RNA (crRNA).

In all, the researchers demonstrated the utility of the CRISPR-Cas9 system as a programmable 'molecular scissor' that could cut in DNA at a chosen spot with unparalleled accuracy. The specific spot could be picked by modifying the crRNA accordingly.

The next year, two teams, led by Feng Zhang and George Church, showed that CRISPR-Cas9 could be used to edit the genomes of eukaryotic organisms.

This innovation has since spurred a myriad applications, from targeted genetic therapies to agricultural advancements. The 2020 Nobel Prize didn't only honour the researchers: it also symbolised the start of a time in which people couldn't just read human genomes but also edit or modify the genetic code, with potentially long-lasting impacts on the future of medicine and genetic engineering.

In November this year, the national regulator in the U.K., the Medicines and Healthcare products Regulatory Agency (MHRA), approved the use of a CRISPR-based method called exagamglogene autotemcel – sold under the brand 'Casgevy' – to treat sickle-cell disease and transfusion-dependent -thalassemia. The approval came after the MHRA evaluated safety and efficacy data in an ongoing clinical trial in 29 and 42 patients respectively.

In close succession, the U.S. Food and Drug Administration also approved Casgevy to treat sickle-cell disease, rendering it one of the first CRISPR-based therapeutics to be approved by two major drug regulators.

In Casgevy, a patient's blood stem cells are extracted, their genes modified to remove the defect that produces the sickling, and regrafted back. These cells then proliferate to produce normal red blood cells.

This microscope photo shows crescent-shaped red blood cells from a sickle cell disease patient in 1972. The disorder affects haemoglobin, the protein in red blood cells that carries oxygen. A genetic mutation causes the cells to become crescent-shaped, which can block blood flow and cause excruciating pain, organ damage, stroke, and other problems. | Photo Credit: Dr. F. Gilbert/CDC via AP

The approvals come full circle 74 years after Linus Carl Pauling described the disease as a molecular disorder. While researchers have developed drugs to treat the symptoms of the disease, Casgevy's approval signals their ability now to fix its molecular basis.

This said, while these approvals for CRISPR-based therapeutics are exciting, they are all based on what researchers call first-generation technologies. CRISPR-based clinical technologies have grown to become more efficacious as well as efficient, with a panoply of new applications and specificities.

One fascinating approach is called base-editing, where scientists edit genomes at the resolution of a single nucleotide (DNA is a polymer consisting of multiple nucleotides chained together).

Just a few weeks ago, Verve Therapeutics announced results from an important clinical trial it has been conducting to test a base-editing approach to treat familial hypercholesterolemia, another prevalent and oft-undiagnosed genetic disease.

Yet another emerging technique is prime editing, where researchers use a search-and-replace strategy to directly write or insert specific sequences into an existing genome with high accuracy. A fourth example is of systems that use CRISPR to modify epigenetic effects (effects of a body's environment on its genes) in targeted fashion.

None of these technologies are without caveats. Researchers have already reported several safety and accuracy issues. An important one is off-target events: where a CRISPR-Cas9 system becomes inaccurate and edits some other part of the genome, with unintended consequences.

So while there is enormous potential for these technologies, the risk needs to be balanced with both short- and long-term benefits. Many of these therapies are also too early in their development cycle. Continued scrutiny and surveillance may yet reveal 'side effects' that we aren't aware of today.

This said, we can still celebrate what Casgevy et al. mean for the millions of people suffering from genetic diseases, including those whose molecular mechanisms remain unknown. The future has arrived, and it looks remarkably promising.

The authors are senior consultants at the Vishwanath Cancer Care Foundation and adjunct professors at the Indian Institute of Technology, Kanpur.

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AN ABUSED WIFE TOOK ON TESLA OVER TRACKING TECH. SHE LOST.

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December 20, 2023 09:58 am | Updated 09:58 am IST

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An abused wife took on Tesla over tracking tech. | Photo Credit: REUTERS

San Francisco police Sergeant David Radford contacted Tesla in May 2020 with a request on a case: Could the automaker provide data on an alleged stalker's remote access to a vehicle?

A woman had come into the station visibly shaken, according to a police report. She told police that her abusive husband, in violation of a restraining order, was stalking and harassing her using the technology in their 2016 Tesla Model X.

The SUV allows owners to remotely access its location and control other features through a smartphone app. She told police she had discovered a metal baseball bat in the back seat — the same bat the husband had previously used to threaten her, the police report stated.

Weeks later, Sergeant Radford asked Tesla for data that might help the investigation. A Tesla service manager replied that remote-access logs were only available within seven days of the events recorded, according to records in a lawsuit the woman later filed. Radford's investigation stalled.

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Cases of technology-enabled stalking involving cars are emerging as [automakers add ever-more-sophisticated features](#), such as location tracking and remote control of functions such as locking doors or honking the horn, according to interviews with divorce lawyers, private investigators and anti-domestic-violence advocates. Such abusive behavior using other devices, such as phone spyware or tracking devices, has long been a concern, prompting technology companies including Google and Apple to design safeguards into their products.

Reuters examined the details of the San Francisco case and another one involving alleged stalking through Tesla technology but could not quantify the scope of such abuse. Tesla has encountered at least one other case of stalking through its vehicle app, according to a Tesla employee's testimony in the San Francisco woman's lawsuit. Some attorneys, private investigators and anti-abuse advocates said in interviews that they knew of similar cases but declined to provide details, citing privacy and security concerns.

Tesla did not respond to requests for comment. Radford and the San Francisco Police Department did not comment on the investigation.

The San Francisco case offers insight into the complex considerations these technologies pose for auto companies and law enforcement. Other automakers offer similar tracking and remote-access features, and an industry group has acknowledged the need for protections to ensure car technology doesn't become a tool for abuse.

The Alliance for Automotive Innovation (AAI), a technology-focused trade group for automakers and suppliers, in 2021 cited spousal violence as a reason why California regulators should not require carmakers to release location or other personal data in most cases under a new state privacy law. The law sought to give consumers broadly the right to access their personal data being tracked by companies. The auto group argued some car owners might improperly request personal data on other drivers of the same vehicle.

Disclosing location-tracking data to an abuser could create "the potential for significant harm," wrote the AAI. The group's membership includes many major automakers, but not Tesla.

Some automakers have taken steps to prevent the misuse of data their vehicles track. General Motors spokesperson Kelly Cusinato said GM's OnStar mobile system allows all drivers to mask their location, even if they are not the vehicle's owner or primary user. Rivian, which makes electric trucks and SUVs, is working on a similar function, said Wassym Bensaid, senior vice president of software development.

Rivian hasn't encountered a case of domestic abuse through its vehicle technology, according to Bensaid, but believes "users should have a right to control where that information goes."

GM declined to comment on whether its technology had been involved in any alleged domestic abuse.

The San Francisco woman sued her husband in state Superior Court in 2020 on claims including assault and sexual battery. She later named Tesla as a defendant, accusing the automaker of negligence for continuing to provide the husband access to the car despite the restraining order against him. Her lawsuit sought monetary damages from Tesla.

The woman, at her request, is identified in court papers only by her initials; she cited a risk of physical harm. Her husband is also identified only by his initials.

Reuters reviewed court filings, police reports, depositions, company emails and other documents in the case, which has not been previously reported.

The woman made multiple requests to Tesla in writing and in person, according to her lawsuit, seeking remote data logs and asking Tesla to disable her husband's account. The requests started in 2018, more than a year before Radford, the police investigator, sought data from Tesla.

Tesla told the woman that it could not remove her husband's access to the car's technology because his name remained on the vehicle's title as a co-owner, along with hers, according to records she filed in her lawsuit.

Tesla prevailed in the lawsuit. After denying the San Francisco police request for evidence, the automaker argued she had no proof that her husband used the car's features to stalk her. Tesla also argued the restraining order against the woman's husband never specifically ordered the

automaker to act.

The woman and her husband settled the lawsuit in 2023 on undisclosed terms. Their divorce case is pending. The restraining order against the husband remains in effect. The husband, in a deposition, denied tracking or harassing his wife through the vehicle's technology. His attorney declined to comment.

In a separate case, Renée Izambard said in an interview that her then-husband was tracking her on his Tesla app after he made comments to her indicating he knew where she had been. Izambard filed for divorce from her husband in 2018 and alleged years of physical and psychological abuse.

Izambard said in an interview her ex-husband's tracking of her through the vehicle was "just one part of a much wider pattern of coercive control."

Her ex-husband and his attorney did not respond to requests for comment.

Unlike the San Francisco woman, Izambard had her own access to change the account settings and turn off its connection to the internet, so she did not have to interact with Tesla, she said. Tesla cars allow a primary account holder to add additional drivers who can access the car's features and settings – or the primary user can deny other drivers that access, according to the San Francisco woman's lawsuit. She complained in court records that the company only allowed one primary account holder even in cases like hers, where two people co-owned the vehicle.

Long before the latest automotive features enabled stalking, abusers used other technology on smartphones or tracking devices, said Jeff Kaplan, a private investigator.

Apple launched its AirTag location-tracking device in 2021 as a way to help people find lost purses or keys. The small tags can easily be concealed in a car's interior or other locations, and soon became a favorite tool for one partner to track another. "I'm getting those all the time," Kaplan said.

Earlier this year, Apple and Google jointly proposed standardized technology that could be adopted by any tech company that would allow for alerting people who are being tracked without their knowledge through tags or smartphone features. The idea, presented to a tech-industry standards organization, won praise from some anti-domestic abuse advocates. Apple and Google did not comment for this story.

In the San Francisco case, Tesla said in response to a plaintiff's written request for information that it "does not have a specific companywide policy" regarding how to handle stalking allegations involving its vehicles' technology.

Stalkers always find a way to use location data, making this problem "totally foreseeable," said Catherine Crump, a Berkeley Law School professor specializing in privacy issues involving technology.

"It is disappointing that a company as sophisticated and well-resourced as Tesla doesn't have better answers to this," said Crump, who is also a former adviser to the White House Domestic Policy Council.

When the San Francisco woman and her husband bought the Tesla Model X in January 2016, he set himself up as the administrator on the account and listed her as an additional driver, her lawsuit said. That meant she could not remove his access without his password.

After they separated in August 2018, a family law judge found she had suffered repeated physical abuse during the marriage, which the husband acknowledged, as well as sexual abuse, which he denied, court records show. The judge found her version of events credible and his "less credible."

Over the next several months, the woman alleged, she regularly returned to the car to find that its settings and features appeared to have been manipulated. She found the doors open, the suspension settings changed, and the vehicle's ability to charge turned off. When she asked service center employees for help, they tried to disconnect the car from the Internet, but those attempts failed, she said in court records.

Two letters, one of them dated in 2018, to Tesla's legal department by anti-domestic abuse advocates on the woman's behalf asked the company to preserve data logs and remove the husband's access. Tesla told the court it could not find these letters in its files.

Eventually, a Tesla service center manager contacted Tesla deputy general counsel Ryan McCarthy for advice, the manager said in a deposition reviewed by Reuters. McCarthy said the woman needed to have her husband removed from the vehicle's title in order for the company to disable his account, the service manager testified.

McCarthy did not respond to requests for comment.

In its successful defense against the woman's lawsuit, Tesla cited the husband's denials and said she had "no proof other than her "belief and imagination" that her husband used the car's technology to stalk her.

San Francisco Superior Court Judge Curtis Karnow agreed with Tesla, writing in a 2022 opinion that both the woman and her husband "had a right" to use the car technology. It is unclear how Tesla was supposed to determine whether her allegations were legitimate, he wrote.

"A jilted partner might fabricate misuse charges to punish the other," Karnow wrote, adding that the consequences of imposing liability for car manufacturers "would be broad and incalculable."

In late 2020, the San Francisco woman was allowed by a family court judge to sell the jointly owned Tesla.

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AI IMAGE-GENERATORS BEING TRAINED ON EXPLICIT PHOTOS OF CHILDREN: STUDY

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LAION told The Associated Press it was temporarily removing its datasets [File] | Photo Credit: REUTERS

Hidden inside the foundation of popular artificial intelligence image-generators are thousands of images of child sexual abuse, according to a new report that urges companies to take action to address a harmful flaw in the technology they built.

Those same images have made it easier for AI systems to produce realistic and explicit imagery of fake children as well as transform social media photos of fully clothed real teens into nudes, much to the alarm of schools and law enforcement around the world.

Until recently, anti-abuse researchers thought the only way that some unchecked AI tools produced abusive imagery of children was by essentially combining what they've learned from two separate buckets of online images — adult pornography and benign photos of kids.

But the Stanford Internet Observatory found more than 3,200 images of suspected child sexual abuse in the giant AI database LAION, an index of online images and captions that's been used to train leading AI image-makers such as Stable Diffusion. The watchdog group based at Stanford University worked with the Canadian Centre for Child Protection and other anti-abuse charities to identify the illegal material and report the original photo links to law enforcement. It said roughly 1,000 of the images it found were externally validated.

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The response was immediate. On the eve of the Wednesday release of the Stanford Internet Observatory's report, LAION told The Associated Press it was temporarily removing its datasets.

LAION, which stands for the nonprofit Large-scale Artificial Intelligence Open Network, said in a statement that it "has a zero tolerance policy for illegal content and in an abundance of caution, we have taken down the LAION datasets to ensure they are safe before republishing them."

While the images account for just a fraction of LAION's index of some 5.8 billion images, the Stanford group says it is likely influencing the ability of AI tools to generate harmful outputs and

reinforcing the prior abuse of real victims who appear multiple times.

It's not an easy problem to fix, and traces back to many generative AI projects being "effectively rushed to market" and made widely accessible because the field is so competitive, said Stanford Internet Observatory's chief technologist David Thiel, who authored the report.

"Taking an entire internet-wide scrape and making that dataset to train models is something that should have been confined to a research operation, if anything, and is not something that should have been [open-sourced](#) without a lot more rigorous attention," Thiel said in an interview.

A prominent LAION user that helped shape the dataset's development is London-based startup Stability AI, maker of the Stable Diffusion text-to-image models. New versions of Stable Diffusion have made it much harder to create harmful content, but an older version introduced last year — which Stability AI says it didn't release — is still baked into other applications and tools and remains "the most popular model for generating explicit imagery," according to the Stanford report.

"We can't take that back. That model is in the hands of many people on their local machines," said Lloyd Richardson, director of information technology at the Canadian Centre for Child Protection, which runs Canada's hotline for reporting online sexual exploitation.

Stability AI on Wednesday said it only hosts filtered versions of Stable Diffusion and that "since taking over the exclusive development of Stable Diffusion, Stability AI has taken proactive steps to mitigate the risk of misuse."

"Those filters remove unsafe content from reaching the models," the company said in a prepared statement. "By removing that content before it ever reaches the model, we can help to prevent the model from generating unsafe content."

LAION was the brainchild of a German researcher and teacher, Christoph Schuhmann, who told the AP earlier this year that part of the reason to make such a huge visual database publicly accessible was to ensure that the future of AI development isn't controlled by a handful of powerful companies.

"It will be much safer and much more fair if we can democratise it so that the whole research community and the whole general public can benefit from it," he said.

Much of LAION's data comes from another source, Common Crawl, a repository of data constantly trawled from the open internet, but Common Crawl's executive director, Rich Skrenta, said it was "incumbent on" LAION to scan and filter what it took before making use of it.

LAION said this week it developed "rigorous filters" to detect and remove illegal content before releasing its datasets and is still working to improve those filters. The Stanford report acknowledged LAION's developers made some attempts to filter out "underage" explicit content but might have done a better job had they consulted earlier with child safety experts.

Many text-to-image generators are derived in some way from the LAION database, though it's not always clear which ones. OpenAI, maker of DALL-E and ChatGPT, said it doesn't use LAION and has fine-tuned its models to refuse requests for sexual content involving minors.

Google built its text-to-image Imagen model based on a LAION dataset but decided against making it public in 2022 after an audit of the database "uncovered a wide range of inappropriate content including pornographic imagery, racist slurs, and harmful social stereotypes."

Trying to clean up the data retroactively is difficult, so the Stanford Internet Observatory is calling for more drastic measures. One is for anyone who's built training sets off of LAION5B — named for the more than 5 billion image-text pairs it contains — to "delete them or work with intermediaries to clean the material." Another is to effectively make an older version of Stable Diffusion disappear from all but the darkest corners of the internet.

"Legitimate platforms can stop offering versions of it for download," particularly if they are frequently used to generate abusive images and have no safeguards to block them, Thiel said.

As an example, Thiel called out CivitAI, a platform that's favoured by people making AI-generated pornography but which he said lacks safety measures to weigh it against making images of children. The report also calls on AI company Hugging Face, which distributes the training data for models, to implement better methods to report and remove links to abusive material.

Hugging Face said it is regularly working with regulators and child safety groups to identify and remove abusive material. Meanwhile, CivitAI said it has "strict policies" on the generation of images depicting children and has rolled out updates to provide more safeguards. The company also said it is working to ensure its policies are "adapting and growing" as the technology evolves.

The Stanford report also questions whether any photos of children — even the most benign — should be fed into AI systems without their family's consent due to protections in the federal Children's Online Privacy Protection Act.

Rebecca Portnoff, the director of data science at the anti-child sexual abuse organisation Thorn, said her organisation has conducted research that shows the prevalence of AI-generated images among abusers is small, but growing consistently.

Developers can mitigate these harms by making sure the datasets they use to develop AI models are clean of abuse materials. Portnoff said there are also opportunities to mitigate harmful uses down the line after models are already in circulation.

Tech companies and child safety groups currently assign videos and images a "hash" — unique digital signatures — to track and take down child abuse materials. According to Portnoff, the same concept can be applied to AI models that are being misused.

"It's not currently happening," she said. "But it's something that in my opinion can and should be done."

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ISRO'S ADITYA L1 MISSION WILL REACH DESTINATION ON JAN 6: SOMANATH

Relevant for: Science & Technology | Topic: Achievements of Indians in science & technology

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December 23, 2023 08:36 am | Updated 08:36 am IST

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ISRO chairman S. Somanath addresses during the second edition of India Space Congress 2023 event, in New Delhi on July 10, 2023. | Photo Credit: ANI

India's maiden solar mission Aditya L1 will reach its destination, the Lagrangian point (L1) which is located 1.5 million km from Earth, on January 6, Indian Space Research Organisation (ISRO) chairman S Somanath said here on Friday.

The mission, the first Indian space-based observatory to study the Sun from a halo orbit L1, was launched by ISRO on September 2 from the Satish Dhawan Space Centre (SDSC) at Sriharikota. "Aditya L1 will enter the L1 point on January 6. That is what is expected. Exact time will be announced at appropriate time," Somanath told mediapersons on the sidelines of the Bharatiya Vigyan Sammelan organised by Vijnana Bharati, an NGO working to popularise science.

"When it reaches the L1 point, we have to fire the engine once again so that it does not go further. It will go to that point, and once it reaches that point, it will rotate around it and will be trapped at L1," he said. Once Aditya L1 reaches its destination, it will help measure various events happening on the Sun for the next five years. "Once it is successfully placed on L1 point, it will be there for the next five years, gathering all the data which are very important not for India alone but for the entire world.

The data will be very useful to understand the dynamics of the Sun and how it affects our life," the ISRO chief said. How India is going to become a technologically powerful country is very important, he said while addressing the gathering. ISRO has made a plan to build an Indian space station, called 'Bharatiya space station' during the 'Amrit Kaal' as per Prime Minister Narendra Modi's instructions, Somanath said.

"In the space sector we are seeing an emergence of new actors. We are going to support, encourage and build the economy around the new generation," he said, adding that India cannot become a leader in everything and that it should focus on those sectors where it can.

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MICROSOFT ENDING SUPPORT FOR WINDOWS 10 COULD SEND 240 MILLION PCS TO LANDFILLS: REPORT

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 23, 2023 03:12 am | Updated 03:12 am IST

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File. | Photo Credit: AP

Microsoft Corp's plan to end support for Windows 10 operating system could result in about 240 million personal computers (PCs) being disposed, potentially adding to landfill waste, Canalys Research said.

The electronic waste from these PCs could weigh an estimated 480 million kilograms, equivalent to 320,000 cars.

While many PCs could remain functional for years post the end of OS support, Canalys warned demand for devices without security updates could be low.

Microsoft announced a plan to provide security updates for Windows 10 devices until October 2028 for an undisclosed annual price.

If the pricing structure for extended Windows 10 support mirrors past trends, migrating to newer PCs could be more cost-effective, increasing the number of older PCs heading to scrap, Canalys said.

Microsoft aims to discontinue support for Windows 10 by October 2025. The next generation of the OS, anticipated to bring advanced artificial intelligence technology to PCs, could potentially boost the sluggish PC market.

Microsoft did not immediately respond to a request for comment on the environmental impact of disposal of Windows 11-incompatible devices.

Hard drives used in personal computers and data storage servers are recycled to gather materials for use in electric vehicle motors and even renewable power generation.

"Turning end-of-life computers into the magnets that power sustainable technologies like electric vehicles and wind turbines will help meet the rising global demand for electricity," said Noveon Magnetics Chief Commercial Officer Peter Afiuny.

Afiuny added hard drives are often discarded before they reach the end of their functional lifespan, creating an excess of rare earth magnetic material waste.

Battery recycling firm Redwood Materials said batteries can be nearly infinitely recycled to recover metals such as lithium, cobalt, nickel and copper.

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WHY RANSOMWARE ATTACKS ON INDIAN IT FIRMS ARE A CAUSE FOR CONCERN?

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 25, 2023 08:30 am | Updated 10:47 am IST

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On 20 December, IT services provider HCL Technologies, in its quarterly report, shared that it was hit by a ransomware incident within a restricted cloud environment. Following the attack, the company stated there was no "observable" impact on the overall HCL Tech network. However, news of the attack affected the company's perception of the stock market, leading to a decline in its share prices.

HCL Tech is an Indian information technology company providing solutions in the digital realm, including end-to-end digital offerings, cloud-based solutions, and software.

The company is one of the top software solution providers in India.

On 20th December, the company, in its quarterly earnings report, sharedthat it was hit by a ransomware incident in an isolated cloud environment.

The company, however, did not disclose specific details of the attack.

HCL Tech further stated that cybersecurity and data protection are top priorities.

A detailed investigation, in consultation with relevant stakeholders, was launched to assess the root cause.

Ransomware is extortion software designed to lock or encrypt a device or data on a system and then demand a ransom for its release.

The attacks follow a simple plan wherein attackers gain access to a device or protected data in the cloud.

Depending on the nature of the ransomware, it will then lock or encrypt devices, data stored in the cloud, or the entire internal network of an organisation.

Attackers usually leave behind a message with instructions on the ransom amount, mode of transfer, or instructions on how to contact them for further guidance.

Indian organisations are increasingly targeted by ransomware attacks.

A 2023 study conducted by Sophos, a cybersecurity company, showed that 73% of organisations reported being victims of ransomware attacks, up from 57% the previous year.

Of these, 77% of organisations reported that attackers succeeded in encrypting data, with 44% paying the ransom to retrieve their data, a significant drop from 78% compared to the previous year.

However, despite paying the ransom, companies doubled their cost of recovery for the data held hostage by threat actors compared to organisations that did not pay the ransom and relied on backups.

Additionally, according to the Indian ransomware report released by India's Computer Emergency Response Team (CERT-In),a 51% increase in ransomware incidentswas reported in H1 2022, with a majority of these attacks targeting data centres, IT, and TeS sectors in the country.

Threat actors tend to focus their attacks on organisations that hold valuable data. The more value the data has to the organisation and its stakeholders, the higher the chances that the ransom will be paid.

IT organisations and software vendors hold a lot of valuable data, including sensitive information like intellectual property.

If leaked by threat actors, it could lead to a drop in their value and replication of software, devaluing the company and threatening its revenue streams, making them a valuable target for cybercriminals. IT organisations providing cloud security and data solutions also hold large repositories of data for their clients. Successful attacks on them could potentially open the channel to target supply chains, adding pressure on companies to pay the ransom.

Data held by IT organisations could include personally identifiable data of clients' users, intellectual property, access credentials, and even financial information. This data can be leveraged to launch further attacks. IT organisations are also among the first to adopt new technologies and encourage the use of open architecture, which may not have the highest levels of protection against cyberattacks, making them a target for cybercriminals.

Earlier this year, in November, a U.S.-based subsidiary of Infosys was reportedly targeted by a ransomware attack. At the time, Infosys McCamish Systems faced an incident involving a ransomware variant.

However, the company did not share details of the attack, stating that further information would be provided following a comprehensive investigation.

In March, Indian drug manufacturer Sun Pharma was hit by a cyberattack.

A ransomware group claimed responsibility for the attack, impacting the company's revenue due to containment measures implemented to mitigate the damage.

In November 2022, a ransomware attack crippled the All India Institute of Medical Sciences (AIIMS) for days. Hackers reportedly demanded 200 crores in cryptocurrency from the hospital.

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MINISTRY SENDS SOCIAL MEDIA PLATFORMS ADVISORY ON DEEPFAKES

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 26, 2023 07:22 pm | Updated December 27, 2023 06:38 am IST - New Delhi

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Union Minister of State for IT Rajeev Chandrasekhar. File | Photo Credit: PTI

The Ministry of Electronics and Information Technology said on Tuesday that it had sent another advisory to social media firms to comply with the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021. The advisory was aimed at getting social media firms to crack down more forcefully on fabricated 'deepfake' clips of people made with Artificial Intelligence. A similar advisory was first sent to social media platforms early in November.

"The advisory mandates that intermediaries communicate prohibited content, particularly those specified under Rule 3(1)(b) of the IT Rules, clearly and precisely to users," the IT Ministry said in a press release. The advisory caps a month of discussions with social media platforms, during which Prime Minister Narendra Modi also made a remark on deepfakes during a Deepavali interaction with supporters.

IT Minister Ashwini Vaishnaw had said in November that rules would soon be formulated to regulate deepfakes. However, no draft has emerged. The government said instead that further IT Rules amendments would follow "if and when required". The IT Ministry did not share a full copy of the advisory sent to platforms.

"Content not permitted under the IT Rules, in particular those listed under Rule 3(1)(b) must be clearly communicated to the users in clear and precise language including through its terms of service and user agreements," the Ministry wrote in the advisory, according to an excerpt shared by the government.

The government's action on deepfakes follow a viral fabricated clip of actress Rashmika Mandanna, who publicly called out the video. Delhi Police arrested four individuals.

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THE NEW YORK TIMES SUES OPENAI AND MICROSOFT FOR USING ITS STORIES TO TRAIN CHATBOTS

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 28, 2023 07:00 am | Updated 07:26 am IST - NEW YORK

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OpenAI, Microsoft and The New York Times logos are seen in this illustration taken December 27, 2023. | Photo Credit: Reuters

The New York Times is striking back against the threat that artificial intelligence poses to the news industry, filing a federal lawsuit on December 27 against OpenAI and Microsoft seeking to end the practice of using its stories to train chatbots.

The Times says the companies are threatening its livelihood by effectively stealing billions of dollars worth of work by its journalists, in some cases spitting out Times' material verbatim to people who seek answers from generative artificial intelligence like OpenAI's ChatGPT. The newspaper's lawsuit was filed in federal court in Manhattan and follows what appears to be a breakdown in talks between the newspaper and the two companies, which began in April.

The media has already been pummeled by a migration of readers to online platforms. While many publications — most notably the Times — have successfully carved out a digital space, the rapid development of AI threatens to significantly upend the publishing industry.

Web traffic is an important component of the paper's advertising revenue and helps drive subscriptions to its online site. But the outputs from AI chatbots divert that traffic away from the paper and other copyright holders, the Times says, making it less likely that users will visit the original source for the information.

"These bots compete with the content they are trained on," said Ian B. Crosby, partner and lead counsel at Susman Godfrey, which is representing The Times.

An OpenAI spokesperson said in a prepared statement that the company respects the rights of content creators and is "committed" to working with them to help them benefit from the technology and new revenue models.

"Our ongoing conversations with the New York Times have been productive and moving forward constructively, so we are surprised and disappointed with this development," the spokesperson said. "We're hopeful that we will find a mutually beneficial way to work together, as we are doing

with many other publishers."

Microsoft did not respond to requests for comment.

Artificial intelligence companies scrape information available online, including articles published by news organizations, to train generative AI chatbots. The large language models are also trained on a huge trove of other human-written materials, which helps them to build a strong command of language and grammar and to answer questions correctly.

But the technology is still under development and gets many things wrong. In its lawsuit, for example, the Times said OpenAI's GPT-4 falsely attributed product recommendations to Wirecutter, the paper's product reviews site, endangering its reputation.

OpenAI and other AI companies, including rival Anthropic, have attracted billions of dollars in investments very rapidly since public and business interest in the technology exploded, particularly this year.

Microsoft has a partnership with OpenAI that allows it to capitalize on the company's AI technology. The Redmond, Washington, tech giant is also OpenAI's biggest backer and has invested at least $13 billion into the company since the two began their partnership in 2019, according to the lawsuit. As part of the agreement, Microsoft's supercomputers help power OpenAI's AI research and the tech giant integrates the startup's technology into its products.

The paper's complaint comes as the number of lawsuits filed against OpenAI for copyright infringement is growing. The company has been sued by several writers — including comedian Sarah Silverman — who say their books were ingested to train OpenAI's AI models without their permission. In June, more than 4,000 writers signed a letter to the CEOs of OpenAI and other tech companies accusing them of exploitative practices in building chatbots.

The lawsuit filed on December 27 cited examples of OpenAI's GPT-4 spitting out large portions of news articles from the Times, including a Pulitzer-Prize-winning investigation into New York City's taxi industry that took 18 months to complete. It also cited outputs from Bing Chat — now called Copilot — that included verbatim excerpts from Times articles.

The Times did not list specific damages that it is seeking, but said the legal action "seeks to hold them responsible for the billions of dollars in statutory and actual damages that they owe" for copying and using its work. It is also asking the court to order the tech companies to destroy AI models or data sets that incorporate its work.

The News/Media Alliance, a trade group representing more than 2,200 news organizations, applauded Wednesday's action by the Times.

"Quality journalism and GenAI can complement each other if approached collaboratively," said Danielle Coffey, alliance president and CEO. "But using journalism without permission or payment is unlawful, and certainly not fair use."

In July, OpenAI and The Associated Press announced a deal for the artificial intelligence company to license AP's archive of news stories. This month, OpenAI also signed a similar partnership with Axel Springer, a media company in Berlin that owns Politico and Business Insider. Under the deal, users of OpenAI's ChatGPT will receive summaries of "selected global news content" from Axel Springer's media brands. The companies said the answers to queries will include attribution and links to the original articles.

The Times has compared its action to a copyright lawsuit more than two decades ago against Napster, when record companies sued the file-sharing service for unlawful use of their material. The record companies won and Napster was soon gone, but it has had a major impact on the industry. Industry-endorsed streaming now dominates the music business.

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FOR HUNTINGTON'S DISEASE CLUES, SCIENTISTS ARE LOOKING IN FRUIT FLIES

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

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December 28, 2023 06:00 am | Updated 06:00 am IST

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A male common fruit fly (*Drosophila melanogaster*), about 2 mm long, is seen sitting on a blade of grass. | Photo Credit: Getty Images/iStockphoto

Every month, the medical genetics clinic in the Nizam's Institute of Medical Sciences, Hyderabad, sees about three to four people with Huntington's disease. The numbers might appear small, but in each case behind the individual lies a family devastated.

At first, Huntington's disease patients have mild symptoms: forgetfulness, loss of balance, and clumsiness in performing simple tasks. The symptoms begin in the ages 30-50, by when the patient might also have had children. The condition progressively worsens. The patient suffers mood swings, has difficulty in reasoning, shows abnormal and uncontrollable jerky movements, and experiences difficulty in speaking, swallowing, and walking.

The patient eventually dies, but not before raising the spectre that one or more of their children will suffer the same fate. There is no cure.

This is why understanding how Huntington's disease progresses at the molecular level is important, so that it can reveal some mechanism that, if interrupted, can stop the disease in its tracks.

A paper published this month in *Scientific Reports*, by researchers from the University of Szeged, in Hungary, has taken some important strides in this direction based on – surprisingly – the diminutive fruit fly.

The patient's misfortune is that they carry a mutated version of a gene called HTT. The HTT gene codes for a protein called huntingtin, or Htt.

Nerve cells in the human body require the Htt protein for their normal functioning and survival. The mutated gene, however, encodes an abnormal Htt protein that instead destroys the neurons that regulate movement, thinking, and memory.

The normal HTT gene contains a stretch of DNA that specifies the number of times the amino acid glutamine is repeated in the Htt protein. This number varies from 11 to 31. In the mutant versions of the HTT gene, this stretch is expanded to encode 35 or more repeats. Researchers

have even found variants with more than 150 repeats.

As the number of repetitions increase, the severity of Huntington's disease increases and its debilitation begins at an earlier age.

Each one of us has two copies of the HTT gene: one we inherited from the father and one from the mother. The disease is triggered even if only one copy of the gene is mutated while the other is normal. That is, the mutant gene is said to be *dominant* to its normal counterpart.

Some proteins other than Htt also have tracts of multiple glutamines. In a subset of these proteins, the DNA sequence that encodes the tract is larger in mutated versions of the gene. And as in Huntington's disease, these mutants also can cause region-specific neuronal degeneration in the brain that leads to muscle control disorders, like spinocerebellar ataxia.

There are many enzymes that can cut up proteins that have polyglutamine tracts to create shorter fragments containing the polyglutamines. These fragments are toxic because they interfere adversely with several cellular processes.

Different neurons have exhibited a graded sensitivity to these fragments depending on the protein.

In sum, genes with polyglutamine tracts are (potentially) bad news. And we neither know why some of these genes are expanded nor how exactly the short fragments cause neuronal degeneration.

In the new study from Hungary, the researchers genetically engineered fruit flies (*Drosophila melanogaster*) to express the polyglutamine tract of a mutated human HTTgene in their nervous system.

To do this, they used a gene called Gal4 from baker's yeast (*Saccharomyces cerevisiae*). Gal4 contains information with which cells manufacture a protein called Gal4p. This protein binds specifically to a short DNA sequence called the upstream activating sequence (UAS). In baker's yeast, when Gal4p binds to UAS, it activates the expression of all the genes that come *after* (i.e. downstream), allowing the yeast to utilise the sugar galactose.

Remarkably, the Gal4/UAS system also works in the fruit fly genome. When the DNA sequence for the Gal4p protein is placed downstream of a fly gene called *elav*, something curious happens: the Gal4p protein is expressed in all of the fly's neurons – and only in the neurons.

If the fly also carries the mutated HTT gene downstream of UAS, then the fly's neuronal cells make the bad Htt protein, with its polyglutamine tract. Again, these proteins are made only in the neurons.

In this way, the researchers were able to modify fruit flies so that their neurons produced Htt proteins that had 120 repeating units of glutamine. These flies displayed neuronal degeneration, an impaired ability to climb surfaces, and lower viability as well as longevity.

The researchers also had a 'control' group, with fruit flies whose neurons made proteins with 25 repeating glutamine units – which is in the 'normal' range for human HTT. And these flies were largely unaffected.

In other words, expressing the longer tract produced symptoms in the fruit flies resembling those of Huntington's disease in humans – whereas expressing the shorter tract did not.

With the two groups in hand, the researchers set about testing whether the pathogenesis resembling Huntington's disease in the fruit flies was changed for better or for worse when they turned the expression of different genes up or down.

The team investigated 32 genes and found that excessive expression – or overexpression – of one, called Yod1, removed all of the disease-like effects in the flies, including the neurodegeneration, impediments to motor activity, and lower viability and longevity. The team also found 'control' flies that expressed only the short tracts in the Htt proteins, or which jointly expressed the short tract and the Yod1 gene, also showed no signs of neurodegeneration.

In addition, the overexpression of Yod1 was also found to increase the expression of other genes involved in specific cellular processes. The researchers interpreted this to mean certain cellular processes could be part of a broader response by the fly to the cellular stress caused by the longer tract.

The study's findings are significant. This said, scientists will still need to establish that fruit flies that overexpress the *human* version of the Yod1 gene will also suppress the Huntington's-like pathogenesis. If the human gene has an ameliorative effect in the fly, it will be reasonable to expect its overexpression could ameliorate Huntington's disease in humans, too.

Science aficionados won't be surprised to find we are more likely to figure out how bigger tracts induce neurodegeneration from studies with fruit flies than with Huntington's disease patients in the clinic or with postmortem brains. Model systems such as fruit flies and yeasts offer scientists unparalleled versatility with which to investigate questions of the molecular mechanisms triggered by disease genes.

As the saying goes, it takes a village to raise a child. Given studies with yeast and fruit flies have revealed a potentially helpful role for a fly protein in Huntington's disease, these and other model creatures – and the scientists who study them – deserve to be counted among the residents of this village.

The author is a retired scientist.

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The Hindu Explains / genetics / research / disease

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GOOGLE SETTLES $5 BILLION CONSUMER PRIVACY LAWSUIT

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December 29, 2023 09:37 am | Updated 09:37 am IST

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The case is Brown et al v Google LLC et al, U.S. District Court, Northern District of California, No. 20-03664 [File] | Photo Credit: REUTERS

Alphabet's Google has agreed to settle a lawsuit claiming it secretly tracked the internet use of [millions of people who thought they were doing their browsing privately.](#)

U.S. District Judge Yvonne Gonzalez Rogers in Oakland, California, put a scheduled February 5, 2024 trial in the proposed class action on hold on Thursday, after lawyers for Google and for consumers said they had reached a preliminary settlement.

The lawsuit had sought at least $5 billion. Settlement terms were not disclosed, but the lawyers said they have agreed to a binding term sheet through mediation, and expected to present a formal settlement for court approval by February 24, 2024.

Neither Google nor lawyers for the plaintiff consumers immediately responded to requests for comment.

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The plaintiffs alleged that Google's analytics, cookies and apps let the Alphabet unit track their activity even when they set Google's Chrome browser to "Incognito" mode and other browsers to "private" browsing mode.

They said this turned Google into an "unaccountable trove of information" by letting the company learn about their friends, hobbies, favourite foods, shopping habits, and "potentially embarrassing things" they seek out online.

In August, Rogers rejected Google's bid to dismiss the lawsuit.

She said it was an open question whether Google had made a legally binding promise not to collect users' data when they browsed in private mode. The judge cited Google's privacy policy and other statements by the company that suggested limits on what information it might collect.

Filed in 2020, the lawsuit covered "millions" of Google users since June 1, 2016, and sought at least $5,000 in damages per user for violations of federal wire-tapping and California privacy laws.

The case is Brown et al v Google LLC et al, U.S. District Court, Northern District of California, No. 20-03664.

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INDIA PLANNING TO LAUNCH 50 SATELLITES FOR INTELLIGENCE GATHERING IN FIVE YEARS: ISRO CHIEF

Relevant for: Science & Technology | Topic: Indigenization of technology and developing new technology

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December 29, 2023 07:56 am | Updated 10:31 am IST - Mumbai

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ISRO Chairman S. Somnath. | Photo Credit: PTI

India is aiming to launch 50 satellites in the next five years for geo-intelligence gathering which will include the creation of a layer of satellites in different orbits with a capacity to track the movement of troops and image thousands of kilometres of area, Indian Space Research Organisation (ISRO) chairman S. Somanath said here on December 28.

For realising India's aspiration to become a strong nation, the current size of its satellite fleet is not enough and it should be "ten times what we have today", he said, speaking at `Techfest', an annual science and technology event organised by the Indian Institute of Technology Bombay here.

It was important to improve the ability of satellites to detect changes, to bring in more of AI-related and data-driven approach to analyse data, reduce data downloads and get only the necessary information, he said.

Spacecrafts are capable of observing a country's borders and neighbouring regions, the ISRO chief noted.

"All of it can be seen from satellites. This capability gives us enormous potential. We have been launching satellites to handle this, but there is a different way of thinking now and we need to look at it in a much more critical manner because the power of (any) nation is the ability to understand what is happening around it," Mr. Somanath said.

Many satellites are being designed and configured, he said.

"We have already configured 50 satellites to be realised in the next five years and this is going to be launched for India for supporting this particular geo-intelligence capability over the next five years plus (period)," the ISRO chief added.

If India is able to launch satellites at this scale, threats to the country can be better mitigated, Mr. Somanath said.

"We have found out a way by which a layer of satellites can be launched starting from GEO (geostationary equatorial orbit) to LEO (lower earth orbit) and also (in) very low earth orbit where we need very critical assessment of some situation," he said.

This is a new domain which is coming up not only in optical, but also in SAR (synthetic aperture radar), thermal and various other technologies, Mr. Somanath pointed out.

"We will have communication between satellites, so that if some satellite detects something, which is at GEO at 36,000 kms, it can have a large view. If you find some activity happening, you can task another satellite in the lower orbit (to check) much more carefully and then give more information," he said.

"We are also looking at imaging, not a very small area (but) thousands of kilometers of area and we would like to cover entire borders in everyday cycles. This is a tremendous capability that we are building if we are able to launch these satellites in the next five years," he said.

Mr. Somanath noted that the overall satellite fleet of the country, with its current strength of 54, is "just not enough" for a nation like India which is aspiring to be powerful and strong.

"I think it must be ten times what we have today," the ISRO chief said.

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ISRO / space programme

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X'S COMMITMENT TO CHILD SAFETY ECLIPSES TWITTER'S IN ACCOUNT SUSPENSIONS: REPORT

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

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December 30, 2023 08:39 am | Updated 08:47 am IST

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X has previously hosted illegal content, including posts promoting deepfake-creation sites [File] | Photo Credit: AP

Elon Musk-owned X said in a report that it outpaced Twitter in terms of suspending accounts for violating its child sexual exploitation policies, based on a yearly comparison.

Between January and November this year, X permanently suspended over 11 million accounts for such violations, while Twitter suspended around 2.3 million accounts in all of 2022, X said in the blog post published on Thursday.

X also said it sent 430,000 reports to the National Center for Missing and Exploited Children (NCMEC) CyberTipline in the first half of 2023, while Twitter sent over 98,000 reports through all of 2022.

"In February 2023, we sent our first ever fully-automated NCMEC CyberTipline report. Historically, every NCMEC report was manually reviewed and created by an agent. Through our media hash matching with Thorn, we now have high-confidence CSAM [child sexual abuse material] hash matches that we automatically suspend, deactivate, and report to NCMEC without human involvement," said the post, adding that it was also looking into videos, GIFs, and keywords to track child sex abuse-related content.

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However, X has previously hosted illegal content, including posts promoting deepfake-creation sites which claim to "undress" girls from real photos.

Musk acquired Twitter for $44 billion in November 2022. Since then, he has faced criticism for bringing back banned accounts and promoting antisemitic speech.

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technology (general) / internet / Twitter

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ISRO TO LAUNCH XPOSAT AND 10 OTHER PAYLOADS ON JANUARY 1

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XPoSat is the first dedicated scientific satellite from ISRO to carry out research in space-based polarisation measurements of X-ray emission from celestial sources. | Photo Credit: file photo

The Indian Space Research Organisation, following a landmark 2023, will ring in the new year with the launch of the PSLV-C58 X-ray Polarimeter Satellite (XPoSat) mission on January 1, 2024.

The PSLV will launch XPoSat and 10 more payloads. The rocket will lift off at 9.10 a.m. from the Satish Dhawan Space Centre in Sriharikota.

"ISRO's PSLV-C58 Mission is to launch XPoSAT Satellite into an Eastward low inclination orbit. After injection of XPoSAT, the PS4 stage will be re-started twice to reduce the orbit into a 350 km circular orbit to maintain in 3-axis stabilized mode for Orbital Platform experiments. The PSLV Orbital Experimental Module-3 experiment will be executed meeting the objective of 10 identified payloads, supplied by ISRO and IN-SPACe," states ISRO on the upcoming mission.

XPoSat is the first dedicated scientific satellite from ISRO to carry out research in space-based polarisation measurements of X-ray emission from celestial sources. It carries two payloads, namely POLIX (Polarimeter Instrument in X-rays) and XSPECT (X-ray Spectroscopy and Timing). POLIX has been developed by Raman Research Institute and XSPECT is by Space Astronomy Group of URSC, Bengaluru.

The PSLV will also launch 10 payloads developed by start-ups, education institutions and ISRO centres.

They are the Radiation Shielding Experimental Module (RSEM) by TakeMe2Space, Women Engineered Satellite (WESAT) by LBS Institute of Technology for Women, BeliefSa-t0 Amateur radio satellite by K.J. Somaiya Institute of Technology, Green Impulse TrAnsmitter (GITA) by Inspecity Space Labs Private Limited, Launching Expeditions for Aspiring Technologies - Technology Demonstrator (LEAP-TD) by Dhruva Space Private Limited, RUDRA 0.3 HPGP by Bellatrix Aerospace Private Limited, ARKA-200 by Bellatrix Aerospace Private Limited, Dust Experiment (DEX) by PRL, ISRO Fuel cell Power System (FCPS) by VSSC, ISRO and Si-based High Energy cell by VSSC, ISRO.

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