

Successful Launch of Akash Missile

Successful Launch of Akash Missile

The Surface to Air Missile AKASH with indigenous radio frequency seeker against target Banshee, has been successfully launched from the Launch Complex-III at ITR Chandipur today at 1338 hrs. The Radars, telemetry and electro-optical systems along the coast have tracked and monitored all the health parameters of the missile. The launch operations were witnessed by Director General (Missiles), DRDO and Scientific Adviser to Raksha Mantri (SA to RM) Dr. G Sathesh Reddy; Director DRDL, Shri MSR Prasad; Program Director, Shri G Chandra Mouli; Director ITR, Dr. BK Das and other top DRDO scientists.

SA to RM congratulated all the DRDO scientists and Armed Forces for this success.

This missile is being inducted into Army as Short Range Surface to Air Missile (SRSAM). This is the first Surface to Air Missile with indigenous seeker that has been test fired. With this success, India has achieved the capability of making any type of Surface to Air Missile.



MJPS/NA/NM

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

U.S. moves to roll back 'net neutrality' regulations

The rules require Internet providers to treat all traffic equally.AP

U.S. regulators voted on Thursday to roll back the so-called “net neutrality” rules, which required Internet service providers to treat all traffic equally, a move opponents say would curb online freedom.

The Federal Communications Commission (FCC), in a three-to-two vote, adopted a proposal by Republican-appointed chairman Ajit Pai, who said his plan would scrap “heavy-handed” rules adopted in 2015, which, he argued, discouraged investment and innovation. The vote capped a heated partisan debate and is just the latest in a battle over more than a decade on rules governing Internet service providers in the courts and the FCC.

Democratic member Mignon Clyburn, one of the two dissenters, charged that the agency was “handing the keys to the Internet” to “a handful of multibillion dollar corporations.” Immediately following the vote, officials from two States and others vowed to challenge the FCC action in court.

Series of protests

Net neutrality activists have staged a series of protests in cities around the U.S. and online, amid fears that dominant broadband providers could change how the Internet works.

“Chairman Pai has given Internet service providers an explicit license to block, slow, or levy tolls on content,” said Ferras Vinh of the Center for Democracy & Technology, a digital rights group.

Net neutrality backers have argued that clear rules are needed to prevent internet service providers from blocking or throttling services or websites for competitive reasons.

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

NASA-Google's exoplanet discovery: All you need to know about AI's interstellar search

The Kepler-90 planets have a similar configuration to our solar system with small planets orbiting close to their star. | Photo Credit: [NASA/Ames Research Center/Wendy Stenzel](#)

On December 14 NASA announced that it has discovered two new exoplanets with a little help from Google. The researchers used the artificial intelligence from Google to analyse the data from Kepler- a telescope placed in space.

Where were the new exoplanets found?

Kepler-80g was found in the planetary system around Kepler 80. Kepler 80 is a star about 1364 light years away which already has five exoplanets around it- 80b, 80c, 80d, 80e and 80f. 80g will now be the outermost planet in the system.

The other exoplanet Kepler-90i was found orbiting Kepler 90. Kepler 90 star is 2722 light years away and was previously known to have seven planets around it- Kepler-90b, 90c, 90d, 90e, 90f, 90g, 90h. The new 90i was found between c and d.

Why is exoplanet Kepler-90i more in the discussion?

With the discovery of the eighth planet Kepler-90i, the planetary system Kepler 90 has matched our solar system. It has become the first star system to have as many planets as our solar system.

Are there any other features similar to our solar system?

According to NASA website, Kepler-90 planets have a similar configuration to our solar system with small planets found orbiting close to their star, and the larger planets found farther away. In our solar system, this pattern is often seen as evidence that the outer planets formed in a cooler part of the solar system, where water ice can stay solid and clump together to make bigger and bigger planets. The pattern we see around Kepler-90 could be evidence of that same process happening in this system.

How did Artificial Intelligence aid the discovery?

"From the millions of data received from Kepler, the programmers trained the computer to pick up specific clues regarding orbit calculation, sense change in brightness when a planet passes across etc., and apply certain algorithms for detection of exoplanets. When all the clues matched the machine was able to interpret and give a positive result. Using machine learning techniques, we can detect even weaker signals that can be missed when done manually," explains Prof. Sengupta Sujan K., Professor at Indian Institute of Astrophysics, Bengaluru.

To know more on exoplanets click [here](#)

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

The Hindu Science Quiz, December 9, 2017

END

crackIAS.com

US FCC ruling on Net Neutrality step back in time

Net Neutrality as it existed since 2015 has now officially been repealed in the US. The US Federal Communications Commission (FCC) has overturned the Obama-era rules and gone back to no regulation around Internet companies and their practices. The repeal of these rules means that in theory, Internet Service Providers (ISPs) in the US are now no longer restricted from creating special pricing for access to certain websites or discriminating against other websites.

Net Neutrality, in simple words, means that an ISP cannot throttle access to a service or charge extra for consumers to access a website. For instance, under strict Net Neutrality rules, an ISP charging extra for access to Netflix or [Facebook](#) or Twitter is not allowed. But the repeal of such rules opens up a whole new and dangerous world for the internet in the US.

Of course, the repealing of Net Neutrality in the US does not have much impact in India, which for now has taken a strong pro-Net Neutrality stance. India's regulator, TRAI in particular, has ruled that ISPs cannot have discriminatory pricing for different services. But the US decision does highlight the kind of dangers that an open, free internet faces both in developed and developing nations. What is also evident is that the US FCC repealed the rules, despite a large public outcry against the decision. In fact, protestors were present outside the FCC building even as the vote took place.

Net Neutrality is a crucial aspect in keeping the internet open and free and ensuring a level playing field for all players. In a market like the US, where a majority of the world's biggest technology companies are based, a decision like this will have a negative impact on the growth of future tech innovations. If ISPs in the US do decide to go for discriminatory pricing, the internet could end up being splintered, and some players will definitely lose.

For now, major ISPs like Comcast and AT&T say they do not plan to throttle the internet, but the dangers are already present. The lack of Net Neutrality in one of the world's most important tech markets means that an online startup might not have the same chance of succeeding as an established player, which can afford to pay for higher speeds. It also means ISPs which have their own apps and content services, can try and unfairly promote these services over those by their rivals. Even in theory, this is a dangerous precedent which has been set.

For the rest of the world, when considering internet governance systems, the current US system of zero regulation can no longer be seen as ideal. Especially for developing nations like India, which often look to other developed nations when considering future laws. In contrast, the European Union has a system, which is much more in favour of Net Neutrality and much more balanced. The EU rules which were put in place in 2016 prohibit ISPs from blocking or slowing down traffic or creating zero-rating services.

Some countries like Netherlands have even stricter rules on Net Neutrality than rest of EU. For now, the US FCC ruling is clearly a step back in time. The full impact of this decision is yet to play out, and there's no doubt it will be closely watched by the rest of the world.

Shruti Dhapola writes on all things Tech for the Indian Express. She tweets at @ShrutiDhops

END

Downloaded from [crackIAS.com](#)

© **Zuccess App** by crackIAS.com

Kalvari submarine a big step in defence preparedness: PM

Giant leap: Narendra Modi atop the INS Kalvari at the Naval Dockyard in Mumbai. PTIPTI

Prime Minister Narendra Modi formally commissioned the first of six Scorpene diesel-electric submarines into the Navy on Thursday. This is the Navy's first modern conventional submarine in almost two decades since the INS Sindhusastra was procured from Russia in July 2000.

"It is a matter of pride for me to commission this submarine. Kalvari's induction in the Navy is a big step in defence preparedness," Mr. Modi said, lauding the Mazagon Dock Shipbuilders Ltd (MDL) for undertaking the project to construct the six submarines with technology transfer from the Naval Group (Formerly DCNS) of France.

The Scorpene submarines can undertake different missions including anti-surface warfare, anti-submarine warfare, intelligence gathering, mine laying and area surveillance, the MDL officials said. The second of the Scorpenes, Khanderi, was launched in January 2017, and is undergoing sea trials. The third, Karanj, is being readied for launch shortly. The rest are in various stages of outfitting. The project is expected to be over by 2020.

Defence Minister Nirmala Sitharaman said peace in the Indian Ocean, the lifeline of global trade, "is better off with INS Kalvari and her follow on submarines."

INS Kalvari is manned by a team of eight officers and 35 sailors.

END

Downloaded from **crackIAS.com**

© **Zuccess App** by crackIAS.com

The growing role of artificial intelligence in business

To meet growing consumer expectations in a digitally-driven world, companies have to deal with huge amounts of real-time data and create personalized consumer experiences to stay relevant. As such, they are increasingly employing newer technologies such as artificial intelligence (AI), cognitive computing and robotics, among others.

From Apple's assistant Siri to self-driving cars, evolution of AI has been transformational, to the extent that it seems to replicate human characteristics, intellect and behaviour. While scientists and experts including Stephen Hawking and Elon Musk have warned against the risks and hazards associated with fully developed and self-aware AI machines, the market is expected to grow rapidly. According to a recent International Data Corp. (IDC) report, AI is expected to drive worldwide revenues from nearly \$8 billion in 2016 to more than \$47 billion in 2020, across a broad range of industries.

The applications of AI range from detecting trends in data to mitigate market risks, enhancing customer service through virtual personal assistants, or even analysing millions of documents across a company's servers to find compliance failures. But it is only recently that companies have been able to anticipate and envision the possibilities that AI and robotics can bring to the future of the business world.

More often than not, the use of AI in business goes unnoticed—especially by the consumers. For instance, few people are aware that the Airbnb application uses Aerosolve, a machine learning (ML) tool, to deliver its dynamic pricing feature. Google's Translate API also uses ML to deliver accurate translations, as it assesses how words relate to each other.

AI helps human decision-making

With ML algorithms becoming smarter and with computing power increasing manifold, the power and success of AI is bound to grow. Although AI currently has a difficult time completing common-sense tasks in the real world, it is adept at processing and analysing troves of data far more quickly than a human brain could. AI can then return with a number of synthesized courses of action and present them to the human user. In this way, humans can use AI to figure out possible consequences of each action and streamline the decision-making process. Now, merging human interactions with AI seems to be a possible solution for managing customers' needs. For instance, Google's search engine uses thousands of human 'raters' to assess the quality of its AI-driven search results. Facebook's facial recognition software asks people to label their photos to improve accuracy.

AI leverages self-learning systems by using tools like data mining, pattern recognition and natural language processing. So, in terms of its key business advantages over human intelligence, AI is highly scalable, resulting in phenomenal cost savings. Besides, AI's consistency and rule-based programs allow enterprises to minimize their errors. Its longevity, coupled with continuous improvements and its ability to document processes, translates into rewarding business opportunities.

How AI can transform business

Indian firms across diverse sectors such as healthcare, education, auto, banking and retail are increasingly tapping AI to transform their businesses. ICICI Bank, for instance, has been experimenting with robotics and AI, through which their email bot sorts out customer and distributor emails on the status of transactions and other similar things, which has helped the bank

reduce its customer response time.

Most big e-tailers like Amazon India are exploring AI solutions to cut costs and overheads, and also to make their platform superior, intuitive and smart. For instance, AI is capable of learning the latest fashion trends by analysing customers' social media feeds, and can assist e-commerce firms in improving search results and recommendations.

AI has been effectively helping businesses decode patterns in their customers' online behaviour and predict the probability of a product return. Most of them are resorting to customer segmentation—leveraging customer data to create specific clusters of customers with shared attributes. This allows them to boost customer loyalty by creating more personalized, relevant marketing messages. Companies such as Flipkart have already adopted this approach to effectively gauge a customer's propensity to return a product, resulting in cost optimization. It also helps in optimizing logistics and ranking vendors based on their 'reputation'.

Customers will continue to rely on AI to help them find and engage with businesses and, on the other hand, firms will have to rely on AI to support and service those customers. Also, employees are going to be more dependent on this technology to perform their work on a daily basis. As these systems take a more central role in the business world, every modern enterprise will need an AI strategy. When combined and designed with the consumer in mind, AI technologies can deliver solutions that drive customer loyalty, engagement, consumption and satisfaction. It is only a matter of time before companies worldwide and across sectors wake up to the real potential of AI.

Prashant Mehta is group vice-president at SapientRazorfish.

END

Downloaded from **crackIAS.com**

© **Zuccess App** by crackIAS.com

PM dedicates INS Kalvari to the nation**PM dedicates INS Kalvari to the nation**

The Prime Minister, Shri Narendra Modi, today dedicated the naval submarine INS Kalvari to the nation, at a function in Mumbai.

Congratulating the people of India on this occasion, the Prime Minister described INS Kalvari as a prime example of "Make in India." He commended all those involved in its manufacture. He described the submarine as an excellent illustration of the fast growing strategic partnership between India and France. He said the INS Kalvari will add even more strength to the Indian Navy.

The Prime Minister said that the 21st century is described as Asia's century. He added that it is also certain that the road to development in the 21st century goes through the Indian Ocean. That is why the Indian Ocean has a special place in the policies of the Government, he added.

The Prime Minister said this vision can be understood through the acronym SAGAR - Security and Growth for All in the Region.

The Prime Minister said India is fully alert with regard to its global, strategic and economic interests in the Indian Ocean. He said that is why the modern and multi-dimensional Indian Navy plays a leading role in promoting peace and stability in the region.

He said the ocean's innate potential adds economic muscle to our national development. That is why, he added, India is well aware of the challenges such as sea-borne terrorism, piracy, and drug trafficking, that not just India, but other nations in the region also have to face. He said India is playing a key role in tackling these challenges.

He said India believes that the world is one family, and is fulfilling its global responsibilities. India has played the role of "first responder" for its partner countries, in times of crisis, he added. He said the human face of Indian diplomacy and Indian security establishment is our speciality. He said a strong and capable India has a vital role to play for humanity. He said countries of the world wish to walk with India on the path of peace and stability.

The Prime Minister said that the entire ecosystem related to defence and security has started to change in the last three years. He said the skill-set accumulated during the manufacture of INS Kalvari is an asset for India.

The Prime Minister said that the Government's commitment has ensured that the long pending issue of "One Rank One Pension" has been resolved.

The Prime Minister said that the Government's policies and the bravery of the Armed Forces have ensured that the use of terrorism as a proxy war in Jammu and Kashmir has not been successful.

The Prime Minister expressed his gratitude to all those who have dedicated their lives to the nation's security.

AKT/HS

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

crackIAS.com

Jupiter's Great Red Spot one-and-a-half Earths wide: NASA

This April 3, 2017 file image made available by NASA shows the planet Jupiter when it was at a distance of about 668 million kilometers (415 million miles) from Earth. | Photo Credit: [AP](#)

Jupiter's Great Red Spot — the solar system's most famous storm — is almost one-and-a-half Earths wide and penetrates about 300 kilometers into the planet's atmosphere, according to data collected by NASA's Juno spacecraft.

Other revelations from the mission include that Jupiter has two previously uncharted radiation zones, NASA researchers said.

"One of the most basic questions about Jupiter's Great Red Spot is: how deep are the roots?" said Scott Bolton, Juno's principal investigator from the Southwest Research Institute in the U.S.

"Juno data indicate that the solar system's most famous storm is almost one-and-a-half Earths wide, and has roots that penetrate about 300 kilometers into the planet's atmosphere," said Bolton.

The science instrument responsible for this in-depth revelation was Juno's Microwave Radiometer (MWR).

"Juno's Microwave Radiometer has the unique capability to peer deep below Jupiter's clouds," said Michael Janssen, Juno co-investigator from NASA's Jet Propulsion Laboratory.

"It is proving to be an excellent instrument to help us get to the bottom of what makes the Great Red Spot so great," said Janssen.

Jupiter's Great Red Spot is a giant oval of crimson-coloured clouds in Jupiter's southern hemisphere that race counter-clockwise around the oval's perimeter with wind speeds greater than any storm on Earth.

Measuring 16,000 kilometers in width as of April 3, this year, the Great Red Spot is 1.3 times as wide as Earth.

"Juno found that the Great Red Spot's roots go 50 to 100 times deeper than Earth's oceans and are warmer at the base than they are at the top," said Andy Ingersoll, professor at Caltech and a Juno co-investigator.

"Winds are associated with differences in temperature, and the warmth of the spot's base explains the ferocious winds we see at the top of the atmosphere," said Ingersoll.

The future of the Great Red Spot is still very much up for debate. While the storm has been monitored since 1830, it has possibly existed for more than 350 years.

In the 19th century, the Great Red Spot was well over two Earths wide. However, in modern times, the Great Red Spot appears to be diminishing in size, as measured by Earth-based telescopes and spacecraft, NASA said.

At the time NASA's Voyagers 1 and 2 sped by Jupiter on their way to Saturn and beyond, in 1979, the Great Red Spot was twice Earth's diameter.

Today, measurements by Earth-based telescopes indicate the oval that Juno flew over has diminished in width by one-third and height by one-eighth since Voyager times.

Juno also has detected a new radiation zone, just above the gas giant's atmosphere, near the equator. The zone includes energetic hydrogen, oxygen and sulphur ions moving at almost light speed.

"The closer you get to Jupiter, the weirder it gets," said Heidi Becker, Juno's radiation monitoring investigation lead at JPL.

"We knew the radiation would probably surprise us, but we didn't think we would find a new radiation zone that close to the planet," said Becker.

The new zone was identified by the Jupiter Energetic Particle Detector Instrument (JEDI) investigation.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

The Hindu Science Quiz, December 9, 2017

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

How marine organisms degrade plastic bags

A single plastic grocery bag could be shredded by marine organisms into over one million microscopic fragments, a study has found.

Marine scientists at the University of Plymouth examined the rate at which bags were broken down by the amphipod *Orchestia gammarellus*, which inhabits coastal areas in northern and western Europe.

The results show that marine wildlife are actually contributing to the spread of microplastics within the marine environment, rather than them simply being emitted from the water supply or forming through the physical and chemical break down of larger items.

Their main aim was to discover whether different types of plastic and the presence of a biofilm — a layer of organic material which accumulates over time — altered the rate at which such organisms broke down plastic debris.

Through monitoring in the laboratory and on the shoreline, researchers demonstrated the bags were torn and stretched by *Orchestia gammarellus*, with microplastics subsequently being found in and around their faecal matter.

The type of plastic — conventional, degradable and biodegradable — had no effect on the rate of ingestion, however the presence of a biofilm meant the shredding took place around four times as quickly.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

As work on a subway extension progressed, fossilised remains of Ice Age creatures — who lived in the region about 10,000 years ago — have been discovered

A look at few of the species that got their status changed on December 4, 2017.

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

What is DNA fingerprinting and how is it done?

Bands of DNA can be compared to identify the individual. | Photo Credit: [Wikimedia Commons](#)

The Rajiv Gandhi Centre for Biotechnology (RGCB) in Thiruvananthapuram is carrying out DNA fingerprint examination to identify the bodies of fishermen found from the sea after the Ockhi storm.

What exactly is DNA fingerprinting? And does it look like crime scene investigations in TV shows?

It is a technique, for identification of an individual by examining their DNA.

DNA, or Deoxyribonucleic acid, is the basic building block of life. This component in cells contains all the information about an organism and it also helps transfer the characteristics to the next generation.

The DNA of each individual is composed of Bases [Adenine (A), Thymine (T), Guanine (G), and Cytosine (C)], Sugar and a Phosphate. Two bases link to each other using hydrogen bonds to form base pairs.

“Every human has three billion such base pairs. Though 99.7% of the make up is similar between any two people; there is a 0.3% difference which accounts to almost 10 million different base pairs. By examining this we can identify the relation between two people. There is a 50% match between a child and his/her father or mother. Between siblings it can range anywhere between 25% to 75%. Monozygotic twins show a 100% match,” explains Dr. Madhusudan Reddy, staff scientist and in-charge at Lab of DNA Fingerprinting Services, Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad.

Blood, bones, hair with root, saliva, semen, teeth, and tissue can also be used to study the DNA.

“We have received the bone and sternum (breast bone) as reference sample for identification of the fishermen. The relatives of the missing person would be asked to come and provide blood samples for DNA study. We will compare the DNA to get a match,” says an official who wished not to be named from regional facility for DNA fingerprinting at RGCB.

The DNA is isolated from the available sample. Each type of sample has a specific protocol for isolation. The DNA fragments are then multiplied using a reaction called Polymerase Chain Reaction (PCR).

One small DNA fragment can become a thousand to million copies. This amplified DNA sample then undergoes a technique called gel electrophoresis, which splits it into different visible bands. The band pattern formed by an individual's DNA is unique. The bands of two or more DNA samples can then be compared using software.

- For criminal identification
- To resolve disputes of maternity /paternity
- To identify mutilated remains
- In cases of exchange of babies in hospital wards,

- In forensic wildlife (The arrangement of the nucleotides is unique to any living form (except identical twins) be animals, plants, or microbes.)

The official from RGCB explained that to resolve parental disputes you need a court order and will be done in the supervision of authorities from police and court.

In July, 2017 the law commission of India drafted a Bill for the use and regulation of DNA-based technology called the Human DNA Profiling Bill.

As there are currently no legal mechanisms for identifying missing persons and victims of disasters, the new Bill seeks to regulate human DNA profiling and establish standard procedures for DNA testing.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Scientists have proven the existence of new form of matter called excitonium - which was first theorised almost 50 years ago. Researchers from ...

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

crackIAS.com

The world of Machine Learning

Artificial Intelligence (AI) may be the great buzzword of our times but Machine Learning (ML) is really the brass tacks. For general conversation, however, the terms have considerable overlap. Some decades ago, a chess playing programme that beat human players could've been crowned 'artificially intelligent' but now there are mundane AIs, like the ones Amazon uses to recommend purchases and 'true' AI that theorists reserve for a point when machines become intelligent enough to take over the planet.

However the path to achieving this is due to advances in designing algorithms, cheap hardware, access to 'training data'— or datasets of all kinds of stuff that computers can use to 'learn' new associations — that have allowed computers to perform several useful tasks better.

Computer science in the 1990s had laid much of the theoretical background for machine learning namely via developing neural networks. This involved, in essence, reviving a philosophy of designing circuits to simulate the way neurons connect in the brain.

The brain with its billions neurons and each connected to a 1000 others is now the dominant metaphor for how ML programs are organised. Rather than older approaches that tried to program the most 'efficient' way to solve a problem (like what's the best sequence of moves to checkmate) ML systems are increasingly organised around letting the systems figure out the rules from scratch. Circuits achieve their goals — differentiating cats from dogs and recognising signatures on cheques—by repetitively blitzing through 'rewards' and 'penalties' and are limited only by the efficiency of the underlying algorithms and computing power at their programmer's disposal.

Using approaches of Deep Learning — an approach where layers of 'neurons' are hierarchically arranged to recognise an object — machines can beat human champions of games that require computation and intuition, such as Go. More usefully, it can look at pictures of biopsies and picking out possible cancers. Some ML (or AI) are being taught to predict the outcome of legal cases, writing press releases and composing music. However the sci-fi future where a machine beats a human in every conceivable department and is constantly self-learning isn't a reality yet.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

The definition of harassment needs to be constantly updated, and the process for justice made more robust

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

Transforming Indo-Japan relations through robots

Japan is serious about its robots. An ageing population, with an estimated 40% of its people projected to be above 65 by 2050, coupled with a low labour force growth rate, is pushing the Japanese, especially at the higher echelons of the government, to look towards its robotics industry to boost productivity levels and fuel growth. In 2014, Prime Minister Shinzo Abe announced a five-year plan to achieve a “robotics revolution” which aimed at incorporating robots into various sectors of the economy and the society such as manufacturing, supply chains, construction and health care as well as expanding the robotics market to \$20 billion by 2020. And it seems like Japan is well on its way to achieving this goal.

Japan’s domestic robotics industry already possesses an edge over its international rivals. Japanese companies such as Fanuc, Yaskawa Electric, and Kawasaki Heavy Industries make up for 50% of the global market in the factory and industrial robotics space. Moreover, cheaper sensors and higher computing power have already driven down prices of industrial robots to almost \$25,000, making them more affordable for small and mid-size factories. It is estimated that as such technologies become cheaper, Japanese factories will be able to reduce their factor of labour costs by almost 25% by 2025.

Furthermore, Japanese society and culture has an inherently different view of robots as compared to the West. Japanese society has traditionally been very open to robots, so much so that even the older generations have a very positive view of robots, often perceiving them as helpmates and equals. This has proved to be a great incentive for Japanese industries as they invest billions of dollars on continuously upgrading technologies in consumer robots that help make daily life more convenient. From Manufacturers Next Technology’s Hana-chan, a robot dog that will sniff out smelly feet to Toyota’s third generation humanoid T-HR3 robot aimed at co-existing and assisting humans in their daily lives, Japan is continuously rolling out sophisticated technologies.

India’s robotics industry on the other hand, is still in its nascent stages, with penetration of industrial robotics limited to large manufacturing concerns. Further, there have been no significant investments in the field of personal or consumer robotics. This situation, however, is starting to change, with the necessary push being given by a clutch of new start-ups. The use of industrial and surgical robots in particular is on the rise. GreyOrange, for example, one of the leading robotics and automation start-ups in India recently launched Butler, a robot that sorts 1.2 crore packets a month, potentially revolutionizing warehouse logistics in the country. Surgical robots are also becoming increasingly popular. Currently, India possesses over 50 surgical robots that conduct an estimated 700 robotic-assisted surgeries each month in the country. But, there is potential for a lot more to be done. According to Vattikuti Foundation, India has the potential to be second largest surgical robot market by 2020.

For all these efforts to bear fruit, however, India needs an integrated and coordinated policy approach for robotics. Firstly, unlike other East and South-East Asian countries such as China, South Korea, Thailand and Singapore, India still lacks a unified policy for commercial robotics. In India, the commercial robotics space has developed primarily through start-ups that operate in a policy vacuum devoid of any specific incentives for such companies. A cohesive national policy would serve as a great incentive for more players to venture into the field.

Secondly, India needs to leverage its IT talent pool in developing intelligent programs, server engineering, embedded programming, and other software aspects of robotics, which are as important as the hardware components. Given India’s current talent pool, this in fact is an area where India could quickly become globally competitive.

Third, the Indian government and industry should begin looking at greater research and technical collaborations with foreign companies and start-ups. Japan, in these respects, is an ideal partner. Not only do its robotics companies have a long and distinguished pedigree, it is also the very edge of startling new innovations. These innovations are not only technical innovations, but also end-use and cultural innovations as has been mentioned above.

With a stagnating domestic market, such Japanese companies also have a vested interest in building better technological relations with India. Leveraging Japanese expertise in robotic manufacturing and channelling local software talent would allow India to come to terms with a fast changing global economic scenario, where automation will rule the roost.

The need of the hour is for all the stakeholders to engage in meaningful conversation and formulate a comprehensive national policy to facilitate the development of the robotics industry in India.

R. Shashank Reddy is research analyst at Carnegie India. For more discussions on these and similar issues, track Carnegie India's Global Technology Summit in Bengaluru on 7 and 8 December. See carnegieindia.org/GTS2017

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

New radio technology for Navy

The Defence Acquisition Council on Wednesday approved the procurement of more than 260 Software Defined Radios (SDR) for the Navy at a cost of more than Rs. 490 crore.

“This is the first indigenously designed and developed SDR to be procured by any of the three services. These will replace the existing systems on-board warships,” a defence source said.

The development of the SDRs was carried out by the Defence Electronics & Applications Laboratory of the DRDO. Bharat Electronics Limited will be the the production Agency.

This technology will improve information sharing and situational awareness through secure voice communications and data transfer capabilities , the source added.

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

crackIAS.com

A measured leap: on planetary system

Scientists have announced the [discovery of two new exoplanets](#), Kepler-90i and Kepler-80g. Exoplanets, or planets outside our solar system, are routinely being discovered, with the number of those that have already been found now standing at 3,567. But this announcement by the National Aeronautics and Space Administration (NASA) of the U.S. is particularly significant. First, with the discovery of the planet Kepler 90i, orbiting the star Kepler 90, we now know of another star besides the Sun that has eight planets orbiting it. Second, Christopher Shallue, a software engineer at Google, and Andrew Vanderburg, of the University of Texas, Austin, have discovered it using a deep learning neural network — an artificial intelligence tool that mimics the workings of a human brain. They “trained” their computer to analyse light readings made by NASA’s Kepler Space Telescope, which are archived and made available for anyone to use. During its mission from 2009 to 2013, the Kepler Space Telescope surveyed nearly 200,000 stars, with 35,000 possible planet signals. The duo’s network was made to learn to identify true signals using 15,000 previously vetted signals. They then studied the weaker signals recorded from 670 star systems that had multiple known planets orbiting them, finally coming up with this discovery. The network also identified another Earth-sized exoplanet, Kepler 80g, orbiting the star Kepler 80. This is a very stable system in which Kepler 80g and four of its neighbours are locked together in a so-called resonant chain.

[Deep learning and neural networks](#) have been used in other applications successfully, as in the AlphaGo AI player of the Go game. This is not also the first time that automation has been used in identifying exoplanets. After the initial years of their discovery, when the number of known exoplanets grew, the need for automating the initial vetting process became clear. The preprint of the Shallue-Vanderburg’s paper, to be published in *The Astronomical Journal*, mentions the Robotveter program, the first attempt at automating the process of rejecting false positives in the signal. The preprint describes the careful process of doing away with the false positives and systemic blips before coming up with the true signals — in this case, the two signals corresponding to Kepler 90i and Kepler 80g. It also indicates the caveats and failure modes in the model where it needs to be improved before it can be used to function independently. Here, then, is the takeaway — good science not only solves problems but also can take a hard look at itself, at where and how it can improve. This is a leap for humankind, a measured leap.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Revving up infrastructure spending is necessary, but not sufficient

END

Downloaded from [crackIAS.com](#)

© **Zuccess App** by crackIAS.com

Get the most out of IoT

This is the largest growth in the history of humans.”

—**Janusz Bryzek, known as “the father of sensors”**

Finally, the sun is rising over many new and exciting technologies—advanced robots, augmented reality/virtual reality, artificial intelligence (AI), 3D printing, Big Data, blockchain and, of course, sensors. The enabler of all of these technologies is the ability to capture data.

The Internet of Things (IoT), as we all know, is a way to capture and make use of data. And it is quite disruptive in its impact on society—be it businesses, consumers or government. The concept is not new, but was constrained by what technology was able to deliver. What has changed to enable these advancements are the effects of scale (cloud, internet and devices), cost (sensors, bandwidth, cloud, processing power) and new innovations (AI, edge computing). Now, IoT products can be built to spec and cost!

To understand how IoT is being deployed by business today, and where the major growth opportunities will be in the future, we spoke with a lot of experts and early adopters. Our analysis uncovered three major findings: one, there is no such thing as “the” IoT; today’s market is heavily driven by specific use-case scenarios. Two, while in the aggregate, companies will spend an incremental \$300 billion on IoT between 2015 and 2020 (over and above their normal technology spend), three industries will account for about 50% of that spending—manufacturing, transport and logistics, and utilities. Other industries such as healthcare, retail and insurance will also see big leaps on the IoT front. Three, although all layers in the IoT technology stack are poised to grow through 2020, the layers are not equally attractive. IoT analytics, apps and services will capture about 50% of this incremental investment.

User industries need to know which IoT use cases have the potential to deliver the most value. Determining this requires recognizing that business leaders are using IoT to solve discrete business challenges. They are asking: how can IoT help our company increase customer satisfaction, improve quality, support new business models and reduce costs? We believe that 10 use cases within industrial IoT are poised to mature rapidly and experience widespread adoption through 2020—predictive maintenance, self-optimizing production, automated inventory management, smart meters, track and trace, remote patient monitoring, distributed generation and storage, connected cars, fleet management, and demand response.

In India, there is also a big evolving opportunity in smart cities. Understanding of the ecosystem (including policymakers, local government, technology and communication providers, etc.) and participation in a strong consortium are key success factors. Businesses may need to think through what role they can play in orchestrating these partnerships and how to shift the current narrative focused on infrastructure to outcome-based use-cases (smart lighting, parking, e-governance services, etc.).

As consumers, our cars, homes and work environments are also getting transformed. As an example, the connected home market in India is on the cusp of breakout growth. This market will also expand from top 15-20 cities to 70-plus cities including several tier-II and tier-III cities over the next few years. Innovative use cases in home protection and appliance diagnostics are feasible in addition to traditional use cases of security, infotainment and lighting.

The technology stack in IoT is complicated—it is not about just one piece of the stack; rather, it is about all the hardware, software and connectivity pieces put together. This complexity may raise a

set of non-trivial questions: What do we build in-house and where do we use partners? How are we going to handle security? Also, the realization of the benefits of IoT depends on businesses being able to gain the insights hidden in the vast and growing seas of data available. The future realization of IoT's promise may depend on machine learning to find the patterns, correlations and anomalies that have the potential of enabling improvements in almost every facet of our daily lives.

In summary, the top five things for business leaders to consider are:

Disrupt or be disrupted: Be bold (but realistic) when rethinking business model and build supportive capabilities (technology, talent) to capture value.

Define vision and implementation road map: Balance long-term targets with road maps for most viable use cases; drive change via iteration between long-term and short-term plans.

Embrace geeks and artists: Be aggressive in the race for talent and don't relegate design.

Create a high-speed, innovative culture: Use agile, iterative processes for rapid project realization.

Play nice: IoT is about ecosystems; look for partners with complementary capabilities, data and skills.

Sumit Sarawgi is partner and director at Boston Consulting Group India. He delivered the keynote on IoT at the CXO round table organized by Mint and SAP India recently in Gurugram.

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

What is the buzz about the new 'interstellar object'?

Artist's impression of the first interstellar object: Oumuamua.

The cigar-shaped rocky object, our first visitor from another solar system is continuing to throw new surprises and is keeping astronomers on their toes.

On December 18, scientists from Queen's University, UK published a letter in *Nature*, stating that the interstellar object that whizzed past our sun in October is made up of icy interiors and carbon-rich surfaces. This has raised many interesting questions as carbon is known as the building block of life.

"Most likely it is of natural origin, but because it is so peculiar, we would like to check if it has any sign of artificial origin, such as radio emissions," said Avi Loeb, professor of astronomy at Harvard University to *The Guardian*. "The chances that we'll hear something are very small, but if we do, we will report it immediately and then try to interpret it," Prof. Loeb said.

"It would be prudent just to check and look for signals...It's really one of the fundamental questions in science, perhaps the most fundamental: are we alone?" he added.

The first interstellar visitor has been named 'Oumuamua', which means messenger in Hawaiian.

Oumuamua was discovered by the Pan-STARRS telescope on October 16, 2017. Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) consists of telescopes and cameras for wide-field astronomical imaging and is located at the Haleakala Observatory in Hawaii, USA.

A group of scientists from the US, Germany and Italy published in *Nature* that the object is extremely red in colour and has a highly elongated cigar shape with a radius more than 100 metres and a length of almost 400 metres.

Though the initial observation was made by Pan-STARRS, other telescopes from Gemini Observatories in Chile and Hawaii and the Very Large Telescope (VLT) in Atacama Desert aided the study. NASA's space telescopes Hubble and Spitzer also started tracking the unusual object in November.

It does not have an icy tail like a comet or any dust debris around it like asteroids. According to the NASA website, the object follows a hyperbolic path around the Sun at a very high speed that cannot be due to acceleration from the Sun's gravity alone. This object must have approached our solar system already with considerable initial speed. The object's high speed also means that the Sun's gravity cannot slow it down enough to keep it bound to our solar system. The object will leave, and end up with about the same speed with which it entered; only its direction will have changed.

Also the website says that the 10:1 elongation ratio of the object is simply not found for any of the objects within our solar system.

According to the NASA website, Oumuamua is travelling at about 38.3 kilometers per second relative to the Sun. Its location is approximately 200 million kilometers from Earth. It further said, "The object passed Mars's orbit around November 1 and will pass Jupiter's orbit in May of 2018. It will travel beyond Saturn's orbit in January 2019; as it leaves our solar system, Oumuamua will head for the constellation Pegasus."

Another study published in *The Astrophysical Journal* letters says that almost 10,000 such interstellar objects maybe dashing past our sun.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Taste science! Take this quiz!

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

crackIAS.com

A new LIGO gravitational wave detector to be built in India by 2025

The LIGO detectors discovered the first gravitational waves produced by two giant merging blackholes last year.

A new gravitational wave detector to measure ripples in the fabric of space and time is set to be built in India by 2025, in collaboration with universities from across the globe.

The new Laser Interferometer Gravitational-Wave Observatory (LIGO) detector will add to the two already operational in the US. The LIGO detectors discovered the first gravitational waves produced by two giant merging blackholes last year. The research won a Nobel Prize in Physics this year.

The location for the new detector in India has been selected, and the acquisition has started, said Somak Raychaudhury, Director of the Inter-University Centre for Astronomy and Astrophysics (IUCAA) Pune. However, the site has not been revealed yet.

“When the detector building is completed in 2025, IUCAA will run it,” Raychaudhury told PTI. The LIGO India partnership is funded by the Science and Technology Facilities Council (STFC) through its Newton-Bhabha project on LIGO. The Raja Ramanna Centre for Advanced Technology in Indore and Institute for Plasma Research in Ahmedabad are in charge of building various parts of the system, said Raychaudhury. The mirrors and detectors required to build the system will be sent from the LIGO collaborators in the US.

A third LIGO detector will help pinpoint the origin of the gravitational waves that are detected in future. The existence of these waves were first predicted by Albert Einstein 100 years ago in his general theory of relativity.

Massive accelerating objects - such as neutron stars or black holes orbiting each other - would disrupt space-time in such a way that ‘waves’ of distorted space would radiate from the source. These ripples travel at the speed of light through the universe, carrying with them information about their origins, as well as invaluable clues to the nature of gravity itself.

An agreement was officially signed at the British Council offices in New Delhi between a consortium of universities in India, led by the IUCAA and a consortium of UK universities, led by the University of Glasgow. This collaborative programme will enable Indian scientists to work with UK institutes for extended periods of time, with reciprocal visits to the India labs to develop infrastructure and provide onsite training, essential to build the capability to deliver a LIGO-India detector.

“We need hundreds of young people who will not only be involved in building the detector, but also running it after 2025,” said Raychaudhury.

IndIGO, the Indian Initiative in Gravitational-wave Observations, is an initiative to set up advanced experimental facilities, for a multi-institutional Indian national project in gravitational-wave astronomy. The IndIGO Consortium includes Indian Institutes of Technology (IIT), Indian Institutes of Science Education and Research (IISER) and Delhi University, among others. Since 2009, the IndIGO Consortium has been involved in constructing the Indian road-map for Gravitational Wave Astronomy and a strategy towards Indian participation in realising the crucial gravitational-wave observatory in the Asia-Pacific region.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

One year to the day of its India launch, Pokemon Go still has its fanatical followers

Other features include a touch screen that registers inputs when the screen is wet, image recognition and features aimed at virtual and augmented reality headsets

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

crackIAS.com

NASA finalizes concept for robotic mission to comet

In an undated handout image, a rendering of an aerial drone for a proposed space exploration mission to Titan, a moon of Saturn. | Photo Credit: [NASA](#)

NASA has selected two finalist concepts for a robotic mission planned to launch in the mid- 2020s - a sample return mission to a comet, and a drone-like rotorcraft that would explore potential landing sites on Saturn's largest moon, Titan.

The US space agency announced the concepts following an extensive and competitive peer review process.

The concepts were chosen from 12 proposals submitted in April under a New Frontiers programme announcement of opportunity.

"This is a giant leap forward in developing our next bold mission of science discovery," said Thomas Zurbuchen, from NASA's Science Mission Directorate in Washington.

"These are tantalizing investigations that seek to answer some of the biggest questions in our solar system today," said Zurbuchen.

The CAESAR (Comet Astrobiology Exploration SAmples Return) mission will acquire a sample from the nucleus of comet 67P/Churyumov-Gerasimenko, that was successfully explored by the European Space Agency's Rosetta spacecraft, to determine its origin and history.

Comets are made up of materials from ancient stars, interstellar clouds, and the birth of our solar system. The CAESAR sample will reveal how these materials contributed to the early Earth, including the origins of the Earth's oceans, and of life.

Led by Steve Squyres of Cornell University in the United States, CAESAR would be managed by NASA's Goddard Space Flight Center.

Dragonfly is a drone-like rotorcraft that would explore the prebiotic chemistry and habitability of dozens of sites on Saturn's moon Titan, an ocean world in our solar system.

Elizabeth Turtle from the Johns Hopkins University Applied Physics Laboratory (APL) in the US is the lead investigator.

The CAESAR and Dragonfly missions will receive funding through the end of 2018 to further develop and mature their concepts.

NASA plans to select one of these investigations in the spring of 2019 to continue on to subsequent mission phases.

The selected mission will be the fourth in NASA's New Frontiers portfolio, a series of principal investigator-led planetary science investigations that fall under a development cost cap of approximately USD 850 million.

Its predecessors are the New Horizons mission to Pluto and a Kuiper Belt object known as 2014 MU69, the Juno mission to Jupiter, and OSIRIS-REx, which will rendezvous with and return a sample of the asteroid Bennu.

NASA also announced the selection of two mission concepts that will receive technology development funds to prepare them for future mission competitions.

The Enceladus Life Signatures and Habitability (ELSAH) mission concept will receive funds to develop cost-effective techniques that limit spacecraft contamination and thereby enable life detection measurements on cost-capped missions.

The principal investigator is Chris McKay of NASA's Ames Research Center in California's Silicon Valley.

Led by Lori Glaze at Goddard, the Venus In situ Composition Investigations (VICI) mission concept will further develop the Venus Element and Mineralogy Camera to operate under the harsh conditions on Venus.

The instrument uses lasers on a lander to measure the mineralogy and elemental composition of rocks on the surface of Venus.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Taste science! Take this quiz!

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

Gene editing technology used to prevent hearing loss in mice

A single treatment involving injection of a genome editing cocktail prevented progressive hearing loss.

In a first, scientists have used a gene editing tool, CRISPR-Cas9 to prevent progressive deafness in mice, an advance that may help cure genetic hearing impairments in humans.

A single treatment involving injection of a genome editing cocktail prevented progressive hearing loss in young animals that would have otherwise gone deaf, David R. Liu from Harvard University said.

Since the study was performed in mice, the implications for treating humans are still unclear. "We hope that the work will one day inform the development of a cure for certain forms of genetic deafness in people," he added.

Nearly half of all cases of deafness have a genetic root, but treatment options are limited. That is because, until recently, researchers did not have the technology to directly treat the underlying problem: the genetic mutations that sabotage hearing.

One such mutation is in a gene called *Tmc1*. A single error in this gene causes the loss of the inner ear's hair cells over time. These delicate bristle-covered cells help detect sound: sound waves bend the bristles, like stalks of wheat in the wind; hair cells then convert that physical information into nerve signals that travel to the brain. Just one copy of a mutated *Tmc1* gene causes progressive hearing loss leading to profound deafness, both in humans and in mice. Researchers surmised that destroying the mutated copy of the gene.

They injected the CRISPR-based tool into the inner ears of infant mice with the hearing loss mutation. After eight weeks, hair cells in treated ears resembled those in healthy animals - densely packed and tufted with hairlike bundles. The hair cells of untreated mice, in contrast, looked damaged and sparse. On average, after four weeks, treated ears could hear sounds about 15 decibels lower than untreated ears. "That's roughly the difference between a quiet conversation and a garbage disposal," Dr. Liu explained.

In humans, such a change could make a major difference in hearing-loss patients' quality of life, he said. Scientists still have a long way to go before trying this approach in humans. However, if applicable, the treatment could be best during childhood as hair cell loss in the inner ear is progressive and irreversible.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

We may lament about the poor state of health in India, but we must also realise that some things have improved. In 1980, only 85 out of every 100 ...

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

Now, a big bubble theory

A Wolf-Rayet star sparkles in the centre of a distinctive blue bubble made of a cloud of dust, hydrogen, helium and other gases. The material expelled from the star can later nourish a new generation of stars and planets. | Photo Credit: [ESA/Hubble/NASA](#)

Scientists have said that the solar system could have formed in the bubbles produced by a giant, long-dead star, which was 40 to 50 times the size of the sun.

Despite the many impressive discoveries humans have made about the universe, scientists are yet to come to a consensus about the birth story of the solar system.

The prevailing theory is that the solar system formed billions of years ago near a supernova.

But the new scenario, explained in a paper in the *Astrophysical Journal*, begins with a giant type of star called a Wolf-Rayet star.

They burn the hottest of all stars, producing tonnes of elements which are flung off the surface in an intense stellar wind.

As the Wolf-Rayet star sheds its mass, the stellar wind ploughs through the material around it, forming a bubble structure with a dense shell.

“The shell of such a bubble is a good place to produce stars,” because dust and gas become trapped inside where they can condense into stars, said study co-author Nicolas Dauphas, Professor at University of Chicago in the U.S.

The researchers estimate that 1% to 16% of all sun-like stars could be formed in such stellar nurseries.

The study addresses a nagging cosmic mystery about the presence of two elements in our solar system compared to the rest of the galaxy.

Meteorites left over from the early solar system suggests there was a lot of aluminium-26. In addition, studies increasingly suggest the solar system had less of the isotope iron-60.

This brings scientists up short, because supernovae produce both isotopes.

“It begs the question of why one was injected into the solar system and the other was not,” said co-author Vikram Dwarkadas from the University of Chicago.

This brought the scientists to Wolf-Rayet stars, which release lots of aluminium-26, but no iron-60.

As for the fate of the giant Wolf-Rayet star, the researchers believe that its life ended long ago, likely in a supernova explosion or a direct collapse to a black hole.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Taste science! Take this quiz!

END

Downloaded from crackIAS.com

© **Zuccess App** by crackIAS.com

crackIAS.com
crackIAS.com

Gravitational waves, gene editing and other top science stories of 2017

"AlphaZero", a Google-run artificial intelligence (AI) programme, won or drew all 100 chess games that it played.

AI beats humans at poker....

In January, Libratus, an artificial intelligence computer created by researchers at Carnegie Mellon University defeated four top class poker players.

In March, "AlphaGo", Google-run artificial intelligence (AI), defeated legendary Go player Lee Sedol.

In December, researchers from Cornell University said that "AlphaZero", another Google-run artificial intelligence (AI) programme, won or drew all 100 chess games that it played.

Habitable earth-size planets?

In February, NASA announced that its Space Telescope Spitzer discovered seven Earth-sized planets around a star called TRAPPIST-1. Three of these planets were reported to be in the habitable zone where liquid water can be found.

March for science

On April 22, Earth Day, thousands of people in over 600 cities took to the streets to draw attention to issues such as 'science policy' and 'evidence-based policymaking'. The Indian version of the march happened on August 9 in over 20 cities with its organisers demanding, among other things, an allocation of at least 3% of GDP toward science research and enactment of policies based on "evidence-based" science.

Homo sapiens are older than imagined

In June, a study published in *Nature* claimed that Homo sapiens are way older than was previously imagined. The researchers studied the facial, mandibular and dental morphology of fossil remains from Morocco and arrived at the conclusion that our species is 315,000 years old.

New particle from CERN

In July, the European Organization for Nuclear Research (CERN) reported the observation of a new particle. Named Xicc++, the new particle contains two charm quarks and one up quark. (Quarks are the building blocks that make up protons and neutrons.) The new particle, almost four times heavier than the proton, was found to live for a very short time (for a million billionths of a second).

Ice shelf breaks, largest iceberg emerges

In July, scientists from Project MIDAS, a UK-based Antarctic research project, reported the formation of a one-trillion tonne iceberg. They said that the iceberg broke off from the Larsen C shelf in Antarctica and is one of the biggest ever recorded.

Neutron stars merge

LIGO's two detectors in the US and their European counterpart Virgo picked up an unusual signal in August that lasted about 100 seconds — longer than the signal caused by black hole collisions. Gravitational waves and light emission were observed from the same cosmic event, proving that it was caused by a collision of two dying stars called neutron stars.

Gene editing and how

A group of international scientists used a gene editing tool called CRISPR-Cas9 and repaired a mutation in a human embryo. The group targeted a gene called MYBPC3 whose mutations can cause heart problems- hypertrophic cardiomyopathy. The results were published in *Nature* in August.

End of the Cassini mission

In September, NASA ended the Cassini-Huygens mission, which was started in 1997 to study Saturn. In its 20 years, Cassini helped researchers in understanding Saturn's surface, its rings and its moons.

Spotting the gravitational waves

When two black holes collide, they cause ripples that spread out across the space, just like ripples in a lake. These gravitational waves were detected by observatories on Earth— the LIGO and VIRGO. This year's Nobel prize was awarded to the three founders of LIGO. The first detection of the wave was in 2015, and the latest was made in September 2017.

Cryo-electron microscopy

In October, the Nobel Prize for Chemistry was awarded to three scientists who worked on the cryo-electron microscopy. In this technique, biological molecules are frozen and their structures are studied using electron beams. The electrons hit the molecules and scatter, which are then caught by a detector to analyse the structure of the molecule.

An interstellar visitor

In October, the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) in the US, spotted a cigar-shaped rocky object, our first visitor from another solar system.

The circadian rhythm mechanism

The Nobel Prize for Medicine this year was awarded to scientists who studied the genes and the proteins in the body responsible for the circadian rhythm. The level of proteins, named PER (period) and TIM (timeless), change over the daily 24-hour cycle and keep the body's biological clock running.

IBM's quantum computer

In November, IBM announced the development of a large and powerful quantum computer capable of handling 50 qubits (quantum bits). According to IBM, this advancement will allow "high-fidelity quantum operations," making computers faster and more efficient than the current supercomputers.

Earth-like solar system

In December, NASA used Google's AI to discover two new exoplanets—Kepler 90i and Kepler 80g. The discovery of the eighth planet in the system Kepler 90 means we now know of one more solar system with eight planets.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Taste science! Take this quiz!

END

Downloaded from **crackIAS.com**

© **Zuccess App** by crackIAS.com

crackIAS.com
crackIAS.com

Interceptor missile successfully tested

The missile lifts off from the Abdul Kalam Island in Odisha. Special arrangement

India on Thursday successfully test-fired an Advanced Air Defence (AAD) interceptor missile, capable of destroying enemy ballistic missiles at low altitude, from a test range in Odisha.

The missile is being developed as part of the Ballistic Missile Defence (BMD) system and it was the third successful test this year.

Lower altitudes

“The endo-atmospheric interceptor made a direct hit with the incoming missile at an altitude of 15 km, completely destroying it. This version has been tested several times, proving its reliability,” a defence official said.

The official stated that shooting down an incoming missile at lower altitudes is more complicated than shooting at higher altitudes due to the higher velocity of the missile.

“The missile is at the terminal stage of its flight and is at maximum velocity. The endo-atmospheric missile is capable of intercepting missiles at altitudes of 15-30 km,” he said.

The test was carried out from Abdul Kalam Island off the Odisha coast in response to an incoming ‘enemy’ missile which was fired from launch complex 3 of the Integrated Test Range (ITR) in Chandipur.

The BMD consists of two interceptor missiles, the Prithvi Defence Vehicle (PDV) for exo-atmospheric ranges and the Advanced Area Defence (AAD) missile for endo-atmosphere or lower altitudes.

(With inputs from PTI)

END

Downloaded from crackIAS.com

© Zuccess App by crackIAS.com

The Hindu's most read science stories in 2017

GSLV Mk3 launched at Satish Dhawan Space Center, Sriharikota in Andhra Pradesh on June 05, 2017. | Photo Credit: [S.R.RAGHUNATHAN](#)

[10\) Pollution at Himalayas](#)

Scientists reported high concentrations of sulphur on the Manali-Leh highway. It was caused by exhaust smoke from the trucks that provide supplies to the Indian army and the ones that carry tourists.

[9\) Launch of GSLV-MARK III](#)

India launched a heavy rocket capable of carrying up to 4 tonnes. On June 5, it carried the GSAT-19 satellite and put it in orbit.

[8\) Seawater to drinking water](#)

Scientists used graphene oxide membrane to filter the salts in seawater to make it potable.

[7\) Loss of India's black hole scientist](#)

Indian scientist Prof. C.V.Vishveshwara who contributed to the theory of black holes passed away on January 16.

[6\) Reach red planet](#)

Over one lakh Indians send their names to Mars. The names written on a microchip will be carried on the InSight Mars mission spacecraft next year.

[5\) Launch of PSLV-C38](#)

On June 23, ISRO launched 31 satellites into space, of which 29 were from other countries.

[4\) 'Saraswati' galaxy](#)

Indian astronomers spotted a new cluster of galaxies 4 billion light years away and named it 'Saraswati'.

[3\) 104 in one](#)

ISRO's PSLV-C37 created history by carrying 104 satellites and placing them in their respective orbits.

[2\) Jamun solar cells](#)

Scientists from IIT Roorkee used the natural pigment in jamun fruit as a photosensitizer to absorb light for use in the solar cells.

[1\) Genetics settles migration debate](#)

DNA study revealed that the Aryans were migrants from Central Asia who moved to India around

2000 to 1500 BC.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Taste science! Take this quiz!

END

Downloaded from **crackIAS.com**

© **Zuccess App** by crackIAS.com

crackIAS.com
crackIAS.com

ISRO to launch 31 satellites in one go aboard PSLV on Jan. 10

The Indian Space Research Organisation (ISRO) on Friday said it would launch 31 satellites, including India's Cartosat-2 series earth observation space craft, in a single mission on January 10.

The mission will be the first 'Polar Satellite Launch Vehicle' (PSLV) mission after the unsuccessful launch of the navigation satellite IRNSS-1H in August this year.

"The launch is tentatively scheduled for January 10," a senior ISRO official said.

The mission's main payload would be India's Cartosat-2 series earth observation satellite. The high-profile Mission Readiness Review committee and Launch Authorisation Board is scheduled to meet soon to take the final call.

PSLV-C40 will be used for the launch from the spaceport in Andhra Pradesh's Sriharikota, about 100 kilometres from Chennai.

The mission would be a combination of 28 nano satellites from abroad, including Finland and the U.S., one micro and one nano satellite from India along with one Cartosat satellite, the official said.

On August 31, India's mission to launch its backup navigation satellite IRNSS-1H on board PSLV-C39 was unsuccessful after a technical snag on the final leg.

In February this year, PSLV-C37 launched the first Cartosat-2 series satellite along with 103 co-passenger satellites in a single flight.

END

Downloaded from **crackIAS.com**

© **Zuccess App** by crackIAS.com