

Current Affairs search results for tag: science-and-technology

1. Romania unveils world's most powerful laser (April 6, 2024)

Developed by a research center in Romania as part of the EU Infrastructure Extreme Light Infrastructure (ELI) project.

An Overview of the News

- Operated by French company Thales, this laser claims to have revolutionary potential in a variety of fields, from healthcare to space exploration.
- At the core of this groundbreaking laser technology lies chirped-pulse amplification (CPA), a method developed by Mourou and Strickland.
- CPA facilitates the amplification of laser power while ensuring safe intensity levels by stretching and compressing the ultra-short laser pulse.
- This innovative technology achieves unprecedented levels of intensity, opening the door to myriad applications such as corrective eye surgery and advanced precision instruments in industrial operations.

Nobel Prize Winner Contribution:

- Gerard Mourou and Donna Strickland were awarded the Nobel Prize in Physics in 2018 for their pioneering work in laser technology.
- His inventions have led to revolutionary advancements by enabling precision instruments and applications.

Possible Applications:

- Nuclear waste treatment: Laser technology can reduce the radioactivity period of nuclear waste, increasing the safety and manageability of disposal.
- Space debris removal: Laser technology can be deployed to clear space debris, reducing the risk of collisions with satellites and spacecraft.
- Medical Advances: The precision of lasers promises breakthroughs in medical treatments, including targeted cancer treatments and advanced surgical techniques.

Involvement of the ELI Project and Thales Group:

- Part of the European Union Infrastructure Extreme Light Infrastructure (ELI) project, which aims to push laser technology boundaries.
- Operated by Thales Group, a leading global provider of aerospace, defense and security solutions, headquartered in France.

2. Stargate, a \$100 billion AI supercomputer (April 5, 2024)

Microsoft and OpenAI have announced the introduction of 'Stargate,' a cutting-edge AI supercomputer with a price tag of \$100 billion.

An Overview of the News:**Project Collaboration and Financing:**

- The project might cost up to \$100 billion to complete.
- OpenAI will support AI research and development, and Microsoft will collaborate to finance the project.

Timeline for Project Completion:

- By 2028, the project is expected to be finished.
- Over the next six years, Stargate is expected to become the largest supercomputer ever constructed.

Investing Priority:

- The purchase of AI processors will account for a sizeable amount of the project's expenditure.

Key Facts about Supercomputers in India and Globally:

- The Airawat supercomputer is the fastest supercomputer in India.
- PARAM 8000, the first supercomputer built in the country
- PARAM Shivay, the first supercomputer in India.
- China is the nation with the most supercomputers, followed by the USA and Japan.
- World's fastest supercomputer: Frontier
- Vijay Pandurang Bhatkar is the father of the Indian supercomputer.

3. President dedicates CAR-T cell therapy at IIT Bombay to the nation (April 4, 2024)

President Draupadi Murmu dedicated CAR-T cell therapy at IIT Bombay to the nation.

An Overview of the News

- CAR-T cell therapy, used in treating cancer patients, has been developed by IIT Bombay-incubated company ImmunoAdoptive Cell Therapy (ImmunoACT) in India.
- This therapy is the result of a collaborative effort between IIT Bombay and Tata Memorial Center (TMC).
- It has been designed and developed at IIT Bombay, with integrated process development and manufacturing conducted at ImmunoACT.

- Clinical investigations and translational studies were conducted by teams at TMH.
- It is expected that the CAR-T cell therapy product has the potential to save many lives at a much lower cost than similar products available outside India.

CAR T-cell therapy:

- It is a treatment method where a patient's T cells, a type of immune system cell, are modified in a laboratory setting to target cancer cells.
- T cells are extracted from the patient's blood, and in the lab, a gene for a specific receptor called a chimeric antigen receptor (CAR) is introduced into these T cells.
- The CAR enables the modified T cells to bind to a particular protein found on the patient's cancer cells.
- Following this modification, large quantities of CAR T cells are cultured in the laboratory and subsequently administered to the patient through infusion.
- This therapy is primarily employed in treating certain types of blood cancers, and ongoing research is exploring its potential for treating other forms of cancer.
- CAR T-cell therapy is also referred to as chimeric antigen receptor T-cell therapy.

4. Successful flight test of Agni-Prime missile (April 4, 2024)

Agni-Prime missile successfully flight tested in Odisha.

An Overview of the News

- The test was conducted jointly by the Strategic Force Command (SFC) and Defense Research and Development Organization (DRDO) from Dr APJ Abdul Kalam Island.
- The Defense Ministry said that the Agni-Prime missile met all the test objectives, demonstrating its reliable performance.

Introduction of Agni-P (Agni-Prime):

- Agni-P, also known as Agni-Prime, is a medium-range ballistic missile under development by India's Defence Research and Development Organisation (DRDO).
- It is the sixth missile in the Agni series and is designed to be a two-stage, surface-to-surface, canister-launched, and road-mobile system.

Purpose and Deployment:

- Agni-P is intended to be deployed within the Strategic Forces Command for operational use.
- Its development aims to enhance India's ballistic missile capabilities, particularly in the medium-range segment.

Key Features and Upgrades:

- The missile incorporates significant upgrades compared to its predecessors.
- These upgrades include advancements in the composite motor casing, navigation systems, and guidance systems.

Maneuverable Reentry Vehicle (MaRV):

- Agni-P is equipped with a maneuverable reentry vehicle (MaRV), enhancing its effectiveness in penetrating enemy defenses and accurately hitting targets.

Solid-Fueled Design:

- Agni-P utilizes solid fuel propulsion, ensuring reliability, mobility, and ease of deployment.

Canister Launch Capability:

- Its canister-launch system adds to its mobility and readiness, allowing for rapid deployment and launch from various platforms.

Strategic Significance:

- The development and deployment of Agni-P mark a significant advancement in India's strategic missile program.
- It strengthens India's deterrence capability and provides a credible response to evolving security challenges in the region.

5. Adani begins Operation of the Copper Unit at Mundra (April 1, 2024)

The first phase of the world's largest copper manufacturing plant in Mundra, Gujarat was launched by the Adani-led group. The company plans to invest \$1.2 billion in this phase.

An Overview of the News**Kutch Copper Operations:**

- Kutch Copper, a subsidiary of Adani Enterprises Limited, commenced operations of its greenfield copper refinery, marking the shipment of the inaugural batch of cathode.
- Production Capacity and Expansion Plans:
 - The plant is estimated to produce 0.5 million tonnes of refined copper annually in its initial phase, with plans to expand to a capacity of 1 million tonnes by March 2029.
 - Upon completion of its second phase, Kutch Copper aims to become the world's largest single-location custom smelter with an annual production target of 1 million tonnes.

ESG Commitment:

- The company pledges to maintain high ESG (Environmental, Social and Governance) performance standards by leveraging advanced technology and digitalization.

Role in India's clean energy transition:

- Increased copper production supports India's transition to clean energy, facilitating the development of technologies for electric vehicles, solar power, wind power and batteries.

Job Creation and Domestic Demand:

- The expansion of copper production is expected to create 2,000 direct and 5,000 indirect employment opportunities and meet India's target of doubling copper demand by 2030.

Diversification and Industry Demand:

- Catering to the growing demand for copper in various industries, Kutch Copper has expanded its offering to include copper tubes for air conditioning and refrigeration.

Reduction in Import Dependence:

- Domestic copper production aims to reduce India's dependence on imported copper, which has increased steadily in recent years.

Stability Practice:

- Kutch Copper prioritizes sustainability by using technology with minimal carbon footprint, allocating green space within the plant area and implementing eco-friendly water management practices.

Industry Scenario:

- Vedanta Ltd is looking to reopen a plant in Tuticorin, Tamil Nadu, while Hindalco Industries Ltd currently operates the largest copper smelter in India with a capacity of 0.5 million tonnes.

Global Production Dynamics:

- Globally, copper production is concentrated, with Chile and Peru being the top producers, collectively accounting for 38% of global production.

6. Indigenous Tejas Mark-1A Set to Replace MiG Series in Indian Air Force (March 29, 2024)

The maiden flight test of the inaugural aircraft of the advanced iteration 'Mark 1A' of the indigenous Tejas fighter jet, produced in India, has concluded triumphantly on March 28, 2024, at the Hindustan Aeronautics Limited (HAL) facility in Bengaluru.

An Overview of the News

- The first aircraft of this series, designated as LA5033, completed an 18-minute flight.
- Notably, the Tejas Mark 1A, the predecessor of this advanced version, has already been incorporated into the Indian Air Force's fleet, enhancing its operational capabilities.
- With continued advancements and successful testing, the Tejas Mark 1A advanced variant is poised to further bolster India's defense capabilities, reinforcing its commitment to self-reliance and indigenous manufacturing in the defense sector.
- The Tejas Mark-1A is set to replace iconic models like the MiG-21, MiG-23, and MiG-27, symbolizing a shift towards modern, domestically produced fighter aircraft.
- Over 65% of the equipment for the Tejas Mark-1A is manufactured domestically.
- The decision to station the Tejas Mark-1A at the Nal airbase in Bikaner, Rajasthan, near the Pakistan border, underscores its role in bolstering India's defense posture in sensitive regions.

What enhancements does the improved version of Tejas offer?

- New technologies include Active Electronically Scanned Array (AESA) radar and Advanced Beyond-Visual Range (BVR) Missile systems.
- Enhanced defensive capabilities for self-protection.
- Added mid-air refueling capability to increase operational range.
- Upgraded radar warning receiver system for quick threat detection.
- Features digital map generator, smart multi-function display, and advanced radio altimeter for improved navigation and communication.

History of Tejas

- The Tejas project began in 1983 under the Light Combat Aircraft Project, with the aircraft's maiden flight taking place on January 4, 2001. It was officially named 'Tejas' by former Prime Minister Atal Bihari Vajpayee in 2003.
- The success of the Tejas project can be attributed to the visionary leadership of scientists like Dr. Kota Harinarayana and his dedicated team, whose relentless efforts and expertise culminated in the creation of an indigenous fighter aircraft.
- Variants of the Tejas tailored for naval operations were initiated in 2007, showcasing the adaptability and versatility of the Tejas platform to meet varied defense requirements, including naval aircraft carrier operations.

7. New Isopod Species Discovered in Kollam Named after ISRO (March 27, 2024)

Scientists have identified a new species of deep-sea isopod, *Brucethoa Isro*, in the deep sea off the Kerala coast, which has been named after the Indian Space Research Organization (ISRO).

An Overview of the News

- This small crustacean, belonging to the genus *Brucethoa*, thrives on eating fish and was specifically located within the gill cavity of the spinyjaw greeneye.
- Notably, it is the second documented species within its genus found in India and has been named *Brucethoa Isro* to honor ISRO's significant space explorations.

Features of *Brucethoa Isro*:

- Females of this species are generally larger than males, measuring 19 mm in length and 6 mm in width, about half the size of the males.

About Isopods:

- Isopods make up a fascinating group of invertebrates within the crustacean family, which includes well-known marine creatures like crabs and shrimp.
- They display remarkable adaptability to diverse habitats ranging from arid deserts to deep sea trenches, demonstrating their global distribution and ecological importance.

General characteristics of Isopods:

- Isopods share common traits despite their diverse forms, including two pairs of antennae, compound eyes, and four sets of jaws.
- Their body is divided into seven parts, each with a pair of walking legs, a short abdominal segment consisting of six fused segments called "plions".

Habitat and Behavior of Isopods:

- Many Isopods live in marine environments, others are found in coastal and shelf waters, where they navigate on the sea floor or live among aquatic vegetation.
- While most isopods are free-living, some marine species exhibit parasitic behavior, relying on other animals for sustenance.

About Kollam:

- Located in Kerala, Kollam has the famous Ashtamudi Lake, which offers beautiful boating opportunities for tourists.
- The city's principal waterway, the Kollam Canal, connects it to the country's extensive water transport network, while several islands lie on the picturesque lake.
- Kollam has tranquil beaches and lush forests, making it a hub for eco-tourism projects like Shenduruni, Thenmala, and Palaruvi.

8. Professor Jayant Murthy honored with Asteroid name (March 27, 2024)

The International Astronomical Union (IAU) recognized Indian scientist Professor Jayant Murthy by naming an asteroid after him.

An Overview of the News

Asteroid (215884) Jayantamurthy

- Originally known as 2005 EX296, this asteroid orbits the Sun between Mars and Jupiter every 3.3 years.
- Its new name, (215884) Jayanta Murthy, will always carry forward the rich legacy of the Indian scientist.

Career and Contribution of Jayant Murthy

- Professor Murthy served as the Acting Director of the Indian Institute of Astrophysics (IIA) and currently holds the rank of Honorary Professor.
- His scholarly achievements in the interstellar medium, ultraviolet astronomy, and space missions have greatly advanced our understanding of the universe.

Participation in NASA's New Horizons Mission

- Professor Murthy played a key role in NASA's New Horizons science team and contributed to the observation of ultraviolet background radiation in the outer reaches of the Solar System.
- The New Horizons mission's historic flyby of Pluto in 2015 provided unprecedented insights into the dwarf planet and its satellites.

Rare Honor and Legacy

- Annapurni Subramaniam, the current director of the IIA, considers the asteroid naming "a very rare honor", linking Professor Murthy with respected predecessors in astronomical research.
- (215884) The naming of Jayanti Murthy symbolizes the outstanding contributions of Professor Murthy and serves as an inspiration for future scientists.

9. Gaia Telescope Unveils Ancient Star Streams: Shiva and Shakti (March 26, 2024)

The Gaia telescope, led by Khyati Malhan, reveals two ancient star streams: Shiva and Shakti.

An Overview of the News

- These streams were formed over 12 billion years ago and exhibit unique classes and compositions.
- The discovery, made by the European Space Agency's Gaia telescope, enhances our understanding of the galaxy's origins.
- Khyati Malhan is from the Max Planck Institute for Astronomy (MPIA) in Germany.

Features and Structure:

- **Unique Orbits and Chemical Structures:** Gaia identifies two distinct structures, Shakti and Shiva, with distinct orbitals and chemical structures.
- **Mass and age:** Each cluster contains about 10 million suns, ranging in age from 12 to 13 billion years, displaying similar orbits and compositions.

Galactic position and origin:

- **Location and formation:** Located toward the galaxy's core, these streams originated as separate fragments that merged into one galaxy early in its history, shedding light on the galaxy's formation.
- **Galactic archaeology:** Discovery of Gaia reveals the oldest stars in the Galaxy, which predate the formation of the galactic disk, suggesting a complex origin involving filaments of gas and dust.

Symbolism and Naming:

- **Divine Inspiration:** Named after the Hindu divine couple, Shiva and Shakti symbolize the creation of the universe, reflecting the distinctive characteristics of stellar streams.
- **Orbital differences:** Shakti stars exhibit orbits slightly more distant from the galactic center, featuring more circular paths than Shiva.

Importance and future prospects:

- **Understanding early galaxies:** This discovery provides insight into the early evolution of the Milky Way, indicating its origin from long filaments of gas and dust that gave rise to stars and galaxies.
- **Future Insights:** Upcoming Gaia data releases may deepen our understanding of these ancient components, aiding research on star clusters, galaxies, and exoplanets beyond the Milky Way.

About Gaia Space Telescope:

- **Mission and operations:** Launched in December 2013, Gaia, operated by the European Space Agency, surveys the sky to create a detailed 3D map of the Milky Way.
- **Objectives and Contributions:** In addition to mapping the Milky Way, Gaia data informs studies on a variety of astronomical phenomena, including star clusters, galaxies, and exoplanets, furthering our understanding of the dynamics of the universe.

10. Aviation Week Laureates Award for Chandrayaan-3 (March 26, 2024)

ISRO's Chandrayaan-3 mission received the prestigious Aviation Week Laureates Award.

An Overview of the News

- Sripriya Ranganathan, Deputy Ambassador at the Indian Embassy in the US, accepted the award on behalf of ISRO.

The award recognizes aerospace excellence, celebrating innovation and exploration.

Aviation Week Laureates Award:

- Highly regarded accolade in the aviation and aerospace industry.
- Celebrates extraordinary achievements encompassing exploration, innovation and vision.
- Over 400 industry professionals and influencers participated, acknowledging the unprecedented achievements.
- ISRO's successful Chandrayaan-3 mission exemplifies the tradition of honoring outstanding contributions to aerospace exploration.

About Chandrayaan-3 Mission:

- Launch and craft details: Launched from Sriharikota on July 14, 2023, using a GSLV-Mark III (LVM-3) heavy-lift rocket. It consists of a lander named Vikram and a rover named Pragyan excluding an orbiter.
- Mission objectives: to perform safe landing, rover exploration and conduct in-situ scientific experiments.
- Budget: Estimated Rs 615 crore.
- Lander and Rover Specifications: Vikram, 2 meters long and weighing more than 1,700 kg, carries a 26 kg lunar rover named Pragyan for spectrometer analysis.
- Landing and deployment: Scheduled for August 23, 2023 on the Moon.
- Operational Period: Designed to operate for up to one lunar day, equivalent to 14 Earth days.