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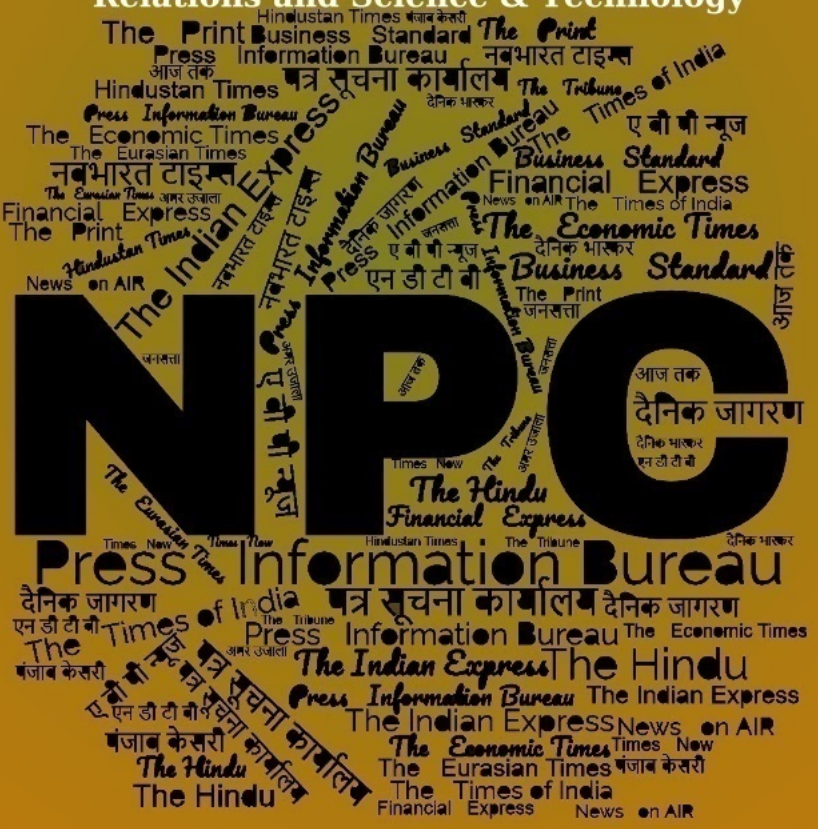
समाचार पत्रों से चयित अंश

Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology



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रक्षा मंत्रालय

Mon, 11 Mar 2024

डीआरडीओ का 'मिशन दिव्यास्त्र' पूरी तरह सफल रहा

स्वदेश में विकसित अग्नि-5 मिसाइल ने एमआईआरवी के साथ पहली उड़ान भरी

रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) ने मल्टीपल इंडिपेंडेंटली टारगेटेबल री-एंट्री व्हीकल (एमआईआरवी) प्रौद्योगिकी से लैस स्वदेश में विकसित अग्नि-5 मिसाइल का प्रथम सफल उड़ान परीक्षण किया। 'मिशन दिव्यास्त्र 'नामक यह उड़ान परीक्षण ओडिशा के डॉ. एपीजे अब्दुल कलाम द्वीप से किया गया। विभिन्न टेलीमेट्री और रडार स्टेशनों ने अनेक री-एंट्री व्हीकल्स को ट्रैक और मॉनिटर किया। इस मिशन ने निर्दिष्ट मानकों को सफलतापूर्वक पूरा किया।

प्रधानमंत्री श्री नरेन्द्र मोदी ने इस जटिल मिशन के संचालन में भाग लेने वाले डीआरडीओ के वैज्ञानिकों के प्रयासों की अत्यंत सराहना की। प्रधानमंत्री ने सोशल मीडिया प्लेटफॉर्म 'X' पर एक पोस्ट में कहा, 'मिशन दिव्यास्त्र के लिए डीआरडीओ के हमारे वैज्ञानिकों पर गर्व है जो मल्टीपल इंडिपेंडेंटली टारगेटेबल री-एंट्री व्हीकल (एमआईआरवी) प्रौद्योगिकी से लैस स्वदेश में विकसित अग्नि-5 मिसाइल का प्रथम उड़ान परीक्षण है।'

रक्षा मंत्री श्री राजनाथ सिंह ने भी इसे असाधारण कामयाबी बताते हुए संबंधित वैज्ञानिकों और पूरी टीम को बधाई दी है।

https://pib.gov.in/PressReleasePage.aspx?PRID=2013610

Press Information Bureau
Government of India

Ministry of Defence

Mon, 11 Mar 2024

DRDO successfully conducts Mission Divyastra

Indigenously developed Agni-5 missile makes maiden flight with MIRV

Defence Research and Development Organisation (DRDO) conducted first successful flight test of indigenously developed Agni-5 missile with Multiple Independently Targetable Re-Entry Vehicle (MIRV) technology. The flight test named Mission Divyastra was carried out from Dr APJ Abdul Kalam Island in Odisha. Various Telemetry and radar stations tracked and monitored multiple re-entry vehicles. The Mission accomplished the designed parameters.

Prime Minister Shri Narendra Modi lauded the efforts of the DRDO scientists who participated in the conduct of the complex Mission. In a post on social media platform X He said, "Proud of our DRDO scientists for Mission Divyastra, the first flight test of indigenously developed Agni-5 missile with Multiple Independently Targetable Re-entry Vehicle (MIRV) technology."

Raksha Mantri Shri Rajnath Singh has also congratulated the scientists and the entire team, terming it as an exceptional success.

https://pib.gov.in/PressReleasePage.aspx?PRID=2013549

The Indian EXPRESS

Mon, 11 Mar 2024

One Missile, Many Weapons: What makes the latest Agni-V special

India on Monday announced that it had successfully tested a new Agni-V missile capable of carrying multiple warheads and striking multiple targets. The most important thing about this new missile is its integration with what is known as the MIRV technology.

MIRV (Multiple Independently Targetable Re-entry Vehicle) technology is the capability that allows multiple warheads to be loaded on a single missile delivery system and programmed to hit different targets, thus greatly enhancing the missile's destructive potential.

The development of MIRV capability marks a significant upgrade for India's missile systems, and expands its nuclear options.

MIRV

Traditional missiles carry a single warhead, or weapon, that goes and hits the intended target. MIRV-equipped missiles can accommodate multiple warheads, each of which can be programmed to strike a separate target. They can all be made to hit the same location too, one after the other, thus ensuring complete annihilation of the target.

While simultaneous strikes at multiple locations can have a debilitating impact on the enemy, the use of nuclear warheads can bring the opposition to its knees.

The technology is not new. It was developed in the 1960s and first deployed in the 1970s by the United States and the then Soviet Union. But it is a complicated technology. The warheads have to be miniaturised, be equipped with independent guidance and navigation controls, and released sequentially from the delivery system.

Over the years, France, the United Kingdom, and eventually China have developed this technology. Pakistan too has claimed to have tested an MIRV-equipped missile called Ababeel, first in 2017 and then in 2023.

The number of warheads that a missile can carry depends on its design, weight, size, range and other parameters. The one that India tested on Monday can carry three to four warheads, V K Saraswat, the former head of Defence Research and Development Organisation (DRDO), said. There are other systems that can carry as many as 15 warheads, or even more.

However, an MIRV-equipped missile has never been used so far in any conflict situation. Arms control advocates argue that MIRV technology incentivises the urge to strike first, thus increasing the risk from nuclear weapons.

Advantages

Apart from the obvious advantage of inflicting multiple damages with a single strike, MIRV is a sought-after military technology for several other reasons. One of them is its ability to penetrate missile defence systems.

A missile defence system is a network of technologies aimed at detecting, tracking, intercepting and destroying an incoming missile. It involves the deployment of sophisticated radars, communication systems, and interceptor missiles. It’s considered a good safeguard against traditional missiles, and several countries are in the process of developing or strengthening their missile defence systems.

The development of MIRV capability marks a significant upgrade for India’s missile systems, and expands its nuclear options. MIRV-equipped missiles, however, can render the system useless. Multiple warheads, each with an independent trajectory, can make the job of tracking and intercepting extremely complicated. In addition, MIRV-equipped missiles can be made to carry decoy warheads to confuse the defence system. It is thus very likely that one or more warheads penetrate the shield created by the defence system, and inflict damage.

Another key strategic benefit, especially for countries like India which has a no-first use policy for nuclear weapons, is the capability to cause crippling damage in a response strike. The response strike could be disproportionate, and can thus serve as a deterrence to the enemy.

Agni upgrade

The integration of MIRV technology is a long-awaited upgrade for the Agni family of short, medium and intercontinental range ballistic missiles indigenously developed by the DRDO. Agni missiles are the main land-based delivery systems for India's nuclear weapons.

Developed in the 1990s, the first-generation Agni missiles were deployed in the armed forces in the mid-2000s. Agni-I to Agni-IV missiles have ranges between 700 to 3,500 km and can carry single payloads weighing between 12 and 40 kilotons. Agni-V, the version that has been equipped with MIRV technology, can travel more than 5,000 km, and can potentially enter the intercontinental range as well, considered to be 5,500 km and above.

Agni-V has been tested several times since 2012, with new features and capabilities. Its previous flight happened in December 2022, when its night-time capabilities were tested, among other things.

Meanwhile, DRDO has also been developing Agni-P missiles, which are modernised versions of the short-range Agni-1 and Agni-2 variety. This missile was tested twice in 2021, and on both occasions there was the expectation that it would be integrated with MIRV technology.

The acquisition of MIRV technology by India was keenly awaited after China developed it in the last decade. With Pakistan also claiming to have tested a missile with this technology, integrating this in Agni missiles had become an imperative. The next generation Agni-VI missile, currently under development, is also expected to be equipped with MIRV.

The development was significant enough for Prime Minister Narendra Modi to himself tell the nation about it, much like he had done five years earlier when DRDO had successfully carried out an anti-satellite test, an equally notable technological achievement that put India among a handful of nations with the capability to strike at an enemy's space-based assets, such as satellites.

Monday's test was carried out from Dr APJ Abdul Kalam Island, off the coast of Odisha, which hosts India's integrated missile test range. "Various telemetry and radar stations tracked and monitored multiple re-entry vehicles. The mission accomplished the designed parameters," DRDO said in a statement.

https://indianexpress.com/article/explained/one-missile-many-weapons-what-makes-the-latest-agni-v-special-9208831/

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Mon, 11 Mar 2024

Launch of 25t Bollard Pull Tug, Baljeet (Yard 306) at M/S Shoft Shipyard Pvt Ltd, Bharuch, Gujarat

25T Bollard Pull (BP) Tug, Baljeet was launched by **Cmde Rajat Nagar, WPS (Mbi)** on **10 Mar 24** at M/s Shoft Shipyard Pvt Ltd, Bharuch, Gujarat. This Tug is a proud flag bearer of "Make in India" initiative of Govt of India.

Contract for construction and delivery of three 25T BP Tug was concluded with M/s Shoft Shipyard Pvt Ltd (M/s SSPL), an MSME, in consonance with "Aatmanirbhar Bharat" initiative of the Government of India. These Tugs are being built under the classification rules of Indian Register of Shipping (IRS). The availability of Tugs will provide impetus to Operational commitments of ***IN*** by facilitating assistance to Naval ships and submarines during berthing and un-berthing, turning and manoeuvring in confined waters. The Tugs will also provide afloat firefighting assistance to ships alongside, at anchorage and will also have capability to conduct limited Search and Rescue Operations.

https://pib.gov.in/PressReleasePage.aspx?PRID=2013411

नवभारत टाइम्स

Mon, 11 Mar 2024

इजरायली और स्विस हथियार भी पीछे, मारक है भारत की स्वदेशी 9 MM पिस्टल, ट्रायल में दिखा दम

भारतीय सेना की नॉर्दन कमांड को 9 एमएम की पिस्टल की जरूरत है। पिस्टल क्लोज कॉम्बेट यानी नजदीक की लड़ाई और आतंकविरोधी अभियानों में काफी मददगार होती है। नॉर्दन कमांड की जरूरतों को पूरा करने के लिए अलग अलग कंपनी ने अपनी पिस्टल के ट्रायल दिए। जिसमें भारत की पहली स्वदेशी 9

एमएम मशीन पिस्टल अस्मि ट्रायल में सफल रही और इजरायली और स्विस हथियारों को ट्रायल में पछाड़ भी दिया। भारतीय सेना को भी इमरजेंसी प्रॉक्योरमेंट के तहत करीब 5000 पिस्टल लेनी थी। जिसके ट्रायल में स्वदेशी पिस्टल सफल रही थी और बिड में भी एल-1 (लोएस्ट बिडर) रही। हालांकि अभी तक कोई कॉन्ट्रैक्ट साइन नहीं हो पाया है।

सूत्रों के मुताबिक नॉर्दन कमांड को करीब 1100 पिस्टल की जरूरत है और ट्रायल के बाद अब टेक्निकल बिड पर काम हो रहा है। भारतीय सेना की नॉर्दन कमांड का जिम्मा जम्मू-कश्मीर और लद्दाख से लगती लाइन ऑफ कंट्रोल यानी एलएओसी, लाइन ऑफ एक्चुअल कंट्रोल यानी एलएसी दोनों है। साथ ही नॉर्दन कमांड जम्मू कश्मीर में आतंकी विरोधी कार्रवाई में भी अहम रोल निभाती है।

अस्मि भारत की पहली स्वदेशी 9 एएम वेपन प्लेटफॉर्म है। 2022 में इंडियन नेवी और सीएपीएफ ने भी इस स्वदेशी पिस्टल के ट्रायल किए थे जिसमें यह पिस्टल सफल रही। अभी एनएसजी, असम राइफल्स और बीएसएफ इन पिस्टल का इस्तेमाल कर रही है। यह पिस्टल क्लोज कॉम्बेट के लिए अहम है। आतंकविरोधी मिशन के लिए पिस्टल की जरूरत होती है। इस स्वदेशी पिस्टल के ऊपर टेलिस्कोप, लेजर बीम, बाइनोक्यूलर लगाया जा सकता है। यह 100 मीटर की रेंज तक सटीक निशाना लगा सकती है। इसमें मैगजीन को पूरा लोड करने पर 33 गोलियां आती हैं। इसका लोडिंग स्विच दोनों तरफ है यानी दाहिने या बाएं हाथ से पिस्टल चलाने वाले को कोई दिक्कत नहीं होगी। इसमें आर्म ग्रिप भी है जो सटीक निशाना लगाने में मददगार साबित होता है। पिस्टल की बट फोल्ड की जा सकती है। कंधे पर टिकाकर या फिर बट को फोल्ड कर सीधे फायर किया जा सकता है।

https://navbharattimes.indiatimes.com/india/indian-army-northern-command-trial-indigenous-9mm-pistol-passed-know-all-about-it/articleshow/108401182.cms

THE ECONOMIC TIMES

Tue, 12 Mar 2024

India remains World's Largest Arms Importer, Russia its Top Supplier

India remains the world's top arms importer and its imports increased by 4.7 per cent between 2014-2018 and 2019-2023, Swedish think tank SIPRI said in a new report on Monday. Russia continued as India's main arms supplier, the Stockholm International Peace Research Institute (SIPRI) said, adding around 55 per cent of arms imports by European states in 2019-23 were supplied by the US, up from 35 per cent in 2014-18.

"India was the world's top arms importer. Its arms imports increased by 4.7 per cent between 2014-18 and 2019-23," the think-tank said in a statement.

"Although Russia remained India's main arms supplier (accounting for 36 per cent of its arms imports), this was the first five-year period since 1960-64 when deliveries from Russia (or the Soviet Union before 1991) made up less than half of India's arms imports," it said.

According to the report, Pakistan significantly increased its arms imports (43 per cent). Pakistan was the fifth largest arms importer in 2019-23 and China became even more dominant as its main supplier, providing 82 per cent of its arms imports, it said.

Arms imports by two of China's East Asian neighbours increased, Japan's by 155 per cent and South Korea's by 6.5 per cent, it said. China's own arms imports shrank by 44 per cent, mainly as a result of substituting imported arms -- most of which came from Russia, with locally produced systems.

"There is little doubt that the sustained high levels of arms imports by Japan and other US allies and partners in Asia and Oceania are largely driven by one key factor: concern over China's ambitions," said Siemon Wezeman, Senior Researcher with the SIPRI Arms Transfers Programme.

"The US, which shares their perception of a Chinese threat, is a growing supplier to the region," it said. Thirty per cent of international arms transfers went to the Middle East in 2019-23. Three Middle Eastern states were among the top 10 importers in 2019-23: Saudi Arabia, Qatar and Egypt. Saudi Arabia was the world's second-largest arms importer in 2019-23, receiving 8.4 per cent of global arms imports in the period, the SIPRI said.

Saudi Arabian arms imports fell by 28 per cent in 2019-23, but this was from a record level in 2014-18. Qatar increased its arms imports almost fourfold (396 per cent) between 2014- 18 and 2019-23, making it the world's third biggest arms importer in 2019-23, according to the report

https://economictimes.indiatimes.com/news/defence/india-remains-worlds-top-arms-importer-sipri-report/articleshow/108399377.cms

Hindustan Times

Mon, 11 Mar 2024

What are Two Chinese Surveillance Vessels up to in Indian Ocean Region?

While Chinese military research-survey-surveillance ship Xiang Yang Hong 3 is currently anchored at Male seaport, another sister ship Xiang Yang Hong 01 is making its way towards the Bay of Bengal for surveillance off India’s eastern seaboard.

The Marine Traffic website shows both the surveillance vessels in the Indian Ocean Region with the pro-China Muizzu government in Maldives allowing the spy ship to be docked at the Male. Since the 01 vessel does not have any listed destination, intelligence inputs indicate that the spy vessel is bound for Sri Lankan port for operational turnaround (OTR). Even though Sri Lanka declared a one-year moratorium against survey vessels last December 22, 2023, inputs indicate that the vessel may dock at Colombo seaport with Ranil Wickremesinghe government under pressure to allow the docking. Both the vessels are being monitored by the Indian Navy.

According to maritime security experts, the overt purpose of these vessels is to carry out hydrography and hydrological surveys for future PLA Navy submarine operations in the IOR but the presence of Chinese spy vessels off India’s eastern seaboard could also be to monitor missile firing off Balasore test range apart from picking signature of Indian nuclear ballistic missile carrying submarine based near Visakhapatnam. India at present has three nuclear-powered ballistic missile-carrying submarines with the third one currently doing deep sea trials.

Under the garb of hydrography surveys, the PLA vessels are known to pick up noise signatures of Indian submarines as well as monitor the test firing of missiles off ITR at A P J Abdul Kalam island and link the coordinates with Chinese spy satellites.

Even though the Chinese vessel 01 is operating in international waters, the IOR maritime situation has become complicated for India with Maldivian President Mohammed Muizzu ready to play the cat's paw for China, Pakistan and Turkey. After taking over as Maldivian President on November 17, 2023, Muizzu, who is a practicing Salafist, made his first trip abroad to Turkey and has now acquired Bayraktar 2 drones for patrolling the Maldivian EEZ. Given that Maldives has no past experience in operating drones, it would be taking help of Turkish armed forces stationed in the littoral nation to fly the drones.

https://www.hindustantimes.com/world-news/what-are-two-chinese-surveillance-vessels-up-to-in-indian-ocean-region-101710129622920.html

Science & Technology News

Press Information Bureau
Government of India

Ministry of Science & Technology

Mon, 11 Mar 2024

Scientists Advance our Understanding of Structural Transitions in Hybrid Perovskites for Renewable Energy Generation

A study by Bharat Ratna Professor C N R Rao and his team has explored precise atomic rearrangements that occur in each phase transition of lead iodide perovskites due to altered temperature and pressure and their resulting effects on optoelectronic properties. Such studies could help in efficient renewable energy generation.

In recent years, lead iodide perovskites have attracted much attention, thanks to their astonishingly good optoelectrical properties which make them excellent solar cell materials. While their energy conversion efficiency can be higher than even that of commercial silicon-based solar cells, lead iodide perovskites are not inherently stable materials. Studies have reported that these materials undergo different structural changes (or 'phase transitions') even under similar conditions. Temperature and pressure shifts can easily modify their crystalline structure, altering their physical properties and lowering their performance.

An in-depth analysis of their reported phase transitions was therefore essential to understand the current limitations of these materials and get on track toward potential solutions.

In a new study, Professor Pratap Vishnoi and Professor C. N. R. Rao from Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Bengaluru, an autonomous institution under the Department of Science & Technology, Govt. of India have reviewed the current knowledge gaps and recent progress on hybrid lead iodide perovskites. The study was published in the Royal Society of Chemistry's Journal of Materials Chemistry A and was supported by a Ramanujan Fellowship by the erstwhile Science & Engineering Research Board (SERB) now ANRF of the Govt. of India.

Prof. Vishnoi and Prof. Rao reviewed over a hundred publications of existing literature on the reported phase transitions and crystal structures. They focused on the results of these studies and the experimental methodologies used by their authors.This approach highlighted the strengths and limitations of the commonly employed techniques, such as X-ray and neutron diffraction. The researchers also touched on the topic of chemical instability in lead iodide perovskites, specifically, how and why these materials decompose when exposed to humid air.

One of the main motivations for undertaking this comprehensive review was the huge potential of these hybrid perovskites for commercial applications, primarily due to their varied and unique crystalline structures. The researchers wanted to know the precise atomic rearrangements that occur in each phase transition and how these changes could lead to degraded stability in solar cells and other practical applications. Notably, the phase transitions induced by temperature and pressure can be quite different in these materials. Thus, two separate main sections were dedicated to exploring the nature of these transitions as sources of instability, highlighting their underlying mechanisms, and their resulting effects on optoelectronic properties.

Further studies on lead iodide perovskites, as well as other types of hybrid perovskites, will hopefully lead to more efficient renewable energy generation. If their instability problems can be efficiently addressed, they could make for great materials for solar cells, since they can be processed into thin films. Other notable use cases are colour LEDs and X-ray shielding in research and medical facilities. Moreover, they may be a clever way to take advantage of phase transitions to store and transport energy. When certain phase transitions occur, some of the energy accumulated in the previous configuration is released as heat. This could be useful for developing thermal energy storage systems, contributing to sustainable energy solutions.

Excited about the possible future in this field, Prof. Vishnoi concludes by saying, "Our perspective is expected to raise the current level of understanding of structures at the atomic level and provide some new strategies to further design and synthesize stable iodide perovskites."

https://pib.gov.in/PressReleasePage.aspx?PRID=2013461

THE ECONOMIC TIMES

Mon, 11 Mar 2024

ISRO's new Meteorological Satellite Initiates Earth Imaging Operations, First Captured Images Released

nity. ISRO on Monday said its meteorological satellite INSAT-3DS has initiated earth imaging operations, and released the first set of images captured by the on-board payloads (6-channel Imager and 19- channel Sounder). The Imager and Sounder payloads are similar to the ones flown on INSAT-3D and INSAT3DR, but significant improvements have been achieved in radiometric accura-

cy, black body calibration, thermal management, and imaging throughput, among others. The payloads were designed and developed at the Space Applications Centre (SAC), Ahmedabad. The first images are processed and released at the Master Control Facility, Hassan in Karnataka. Noting that the 6-channel Imager equipment captures images of the earth's surface and atmosphere across multiple spectral channels or wavelengths, it

said the use of multiple channels allows for gathering information about various atmospheric and surface phenomena, such as clouds, aerosols, land surface temperature, vegetation health, and water vapour distribution

"The Imager could be configured to capture specific features of interest," ISRO said. The 19-channel Sounder captures radiation emitted by the earth's atmosphere through channels carefully chosen to capture radiation emitted by different atmospheric constituents and properties like water vapour, ozone, carbon dioxide, and other gases, while others may be designed to measure temperature variations in different layers of the atmosphere, it added.

These payloads generate over 40 geophysical data products such as Sea Surface Temperature, Rainfall (precipitation) Products, Land Surface Temperature, Fog Intensity, Outgoing Longwave Radiation, Atmospheric Motion Vectors, High-Resolution Winds, Upper Tropospheric Humidity, Cloud Properties, Smoke, Fire, Mean Surface Pressure, Temperature Profiles, Water Vapor Profiles, Surface Skin Temperature and Total Ozone for the user community.

The data collected derives information about the vertical structure of the atmosphere, crucial for weather forecasting, climate monitoring, and understanding atmospheric processes, ISRO said. The space agency said after completing orbit-raising operations, the satellite, launched on February 17, reached the designated geostationary slot for the In Orbit Testing (IOT) on February 28.

IOT of the Satellite Communications was conducted between February 29 and March 3. As part of Meteorological Payload IOT, the first session of imaging for Imager and Sounder payloads was carried out on March seven. The payload parameters are found to be nominal, complying with payload specifications, it said, adding, thus, all the payloads of INSAT-3DS have been tested to perform nominally.

https://economictimes.indiatimes.com/news/science/isros-new-meteorological-satellite-initiates-earth-imaging-operations-first-captured-images-released/articleshow/108400522.cms

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IIT Kharagpur's breakthroughs in AI-enabled iWeld Defect Analysis Earn Recognition and Commercialisation Opportunities

IIT Kharagpur has proven its tryst with innovation in the field of Artificial Intelligence with two of its projects on AI-enabled nondestructive testing for weld defect analysis, from Centre of Excel-

lence in Advanced Manufacturing Technology (CoEAMT), IIT Kharagpur led by Prof. Surjya K Pal, Chairperson, Centre of Excellence in Advance Manufacturing. These two innovative solutions have been shortlisted by TATA STEEL for "TechEx 2024" exhibition. The first, "iWeld, an AI-enabled NDT" software is an innovative solution developed for Garden Reach Shipbuilders & Engineers (GRSE) Kolkata, Ministry of Defence.

iWeld is designed to identify, localize and classify different types of weld defects, such as blow-hole, wormhole, porosity lack of fusion and inclusion from radiography porosity, lack of fusion, and inclusion, from radiography images with remarkable accuracy. The performance of the iWeld has been certified by the Indian Register of Shipping. This was also recently shortlisted as one of the four innovations from IIT Kharagpur which were showcased at "IInventiv 2024" – the first-of-its-kind, mega R&D fair, where all IITs, NITs and other top Institutions in the country participated to showcase the their cutting-edge innovations in R&D.

The ability of iWeld to enhance the quality and efficiency of weld inspections has marked it as a truly successful product, standing as a testament to successful collaboration between CoEAMT and GRSE. Jointly copyrighted with GRSE, iWeld is now primed for commercialization. Mr. Avishek Mukherjee, a Doctoral Scholar in Advanced Technology Development Centre, has devoted considerable effort and dedication to bring about this development.

"Recently, this has also been selected and showcased by the mega technical Event, IInventiv 2024, organised by MoE at IIT Hyderabad. This software is already certified by Indian Register of Shipping, and has been handed over to GRSE for daily operational usage with human-like accuracy. This software has been jointly copyrighted with GRSE as well. It is a product with TRL:8/9. GRSE and CoEAMT will now jointly go ahead for commercialization at other industrial ends. AI-enabled NDT for auto evaluation of weld defects from Ultrasound data: This project is being funded by TIH. It has already been filed for patent. A group of students at CoEAMT are planning to spin-off soon with these AI-enabled NDT solutions for weld defect defect analyses. Our students are doing wonderful job. Their success for solving perennial industrial problems is awesome. The credit goes to the interns and scholars," said Prof. S K Pal, Chairperson, CoEAMT.

The second solution, "iToFD", under a project funded by (TiH) of IIT Kharagpur, revolutionizes the detection and sizing of weld defects using ultrasonic time-of-flight diffraction (ToFD) data. This cutting-edge system integrates advanced signal processing with AI algorithms for precise defect localization and measurement. This automated solution, patented recently (Patent filed ref no: 202331060331), is nearly 15 times faster than traditional manual inspections.

A K Vishwanathan, Undergraduate student in Chemistry; Sarvan Kumar Singh, Undergraduate student in Chemical Engineering; Ananta Dutta, Doctoral Scholar in Mechanical Engineering, and Avishek Mukherjee, Doctoral Scholar in Advanced Technology Development Centre are diligently contributing to this project. "The Centre of Excellence in Advanced Manufacturing Technology at IIT Kharagpur is geared up in solving various perennial problems of the industries through deployment of artificial intelligence, and Industry 4.0 concepts.

I am extremely happy to see the passion of students associated with the CoEAMT while working with the industries, at this stage of their lives, providing innovative solutions. They shine with a

profound grasp of industrial challenges. CoEAMT is open to induct more students and train them to take up interesting and challenging industrial problems, and solve them," added Prof. Pal.

https://timesofindia.indiatimes.com/education/news/iit-kharagpurs-breakthroughs-in-ai-enabled-iweld-defect-analysis-earn-recognition-and-commercialisation-opportunities/articleshow/108400386.cms