

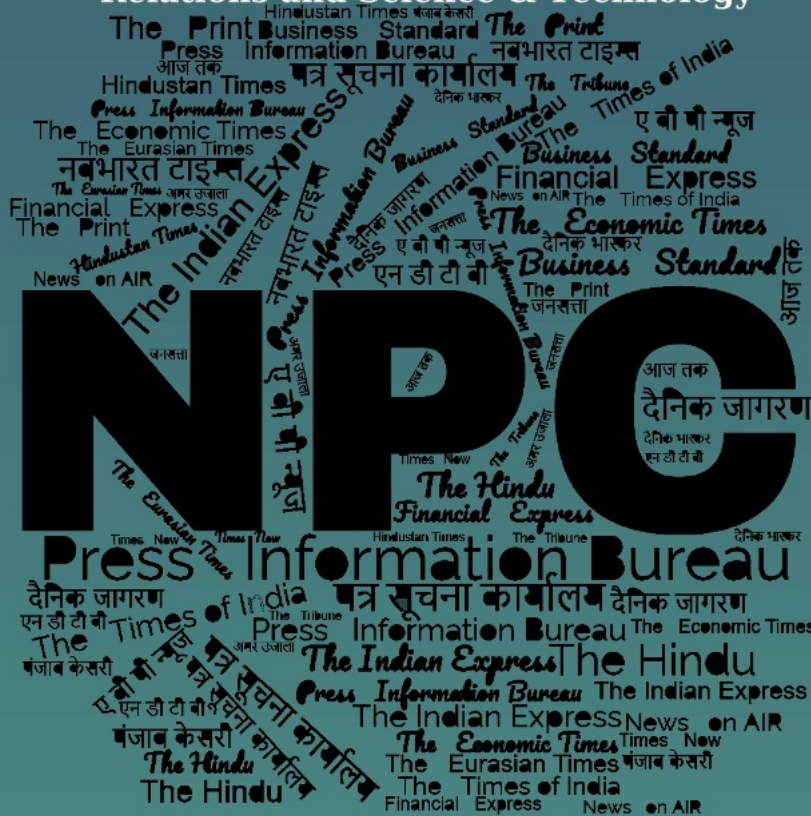
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Defence News

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Mon, 02 Dec 2024

India - Malaysia Joint Military Exercise Harimau Shakti Commences In Bentong Camp, Malaysia

The 4th edition of India- Malaysia Joint Military Exercise HARIMAU SHAKTI commenced today, at Bentong camp, Pahang district, Malaysia. The Exercise is scheduled to be conducted from 2nd to 15th December 2024.

Indian contingent comprising of 78 personnel is being represented by a Battalion of MAHAR Regiment. The Malaysian contingent is being represented by 123 personnel from The Royal Malaysian Regiment. Joint Exercise HARIMAU SHAKTI is an annual training event conducted alternatively in India and Malaysia. Last edition was conducted in Nov 2023 at Umroi Cantonment in Meghalaya, India.

Aim of the Joint Exercise is to enhance joint military capability of both sides to undertake counter insurgency operations in jungle terrain under Chapter VII of the United Nations Mandate. The exercise will focus on operations in the jungle environment.

The exercise will be conducted in two phases. The first phase will be focused on cross training between both the Armies including lectures, demonstrations, and practices of various drills in jungle terrain. In the final phase both the Armies will take active part in a simulated exercise, wherein troops will execute various drills including Anti-MT Ambush, Occupation of Harbour, Carrying out Recce Patrol, Ambush and an Attack on area taken over by the terrorists.

Exercise HARIMAU SHAKTI will enable both sides to share best practices in Tactics, Techniques and Procedures of conducting joint operations. It will facilitate developing inter-operability, bonhomie and camaraderie between the two armies. The Joint Exercise will also enhance defence cooperation, further augmenting bilateral relations between the two friendly nations.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2079649>



**Press Information Bureau
Government of India**

Ministry of Defence

Tue, 03 Dec 2024

DAC approves 05 capital acquisition proposals worth Rs. 21,772 Crores to augment defence preparedness

Procurement of Water Jet Fast Attack Crafts, Fast Interceptor Craft, Electronic Warfare Suite (EWS), Next Generation Radar Warning Receiver, Advanced Light Helicopters for surveillance in coastal areas approved

The Defence Acquisition Council (DAC), under the chairmanship of Raksha Mantri Shri Rajnath Singh on December 03, 2024, accorded Acceptance of Necessity (AoN) for 05 capital acquisition proposals amounting to over Rs. 21,772 Crores.

DAC granted Acceptance of Necessity (AoN) for the procurement of 31 New Water Jet Fast Attack Crafts (NWJFACs) for the Indian Navy. These are designed to perform the task of Low Intensity Maritime Operations, Surveillance, Patrol, and Search and Rescue (SAR) operations close to coast.

In addition, these vessels will play an effective role in Anti-Piracy missions, especially in and around our Island territories. DAC also accorded AoN for procurement of 120 Fast Interceptor Craft (FIC-1). These vessels are capable to perform multiple roles, including escorting High Value Units such as Aircraft Carriers, Destroyers, and Frigates, Submarines for coastal defence.

AoN for procurement of Electronic Warfare Suite (EWS) comprising External Airborne Self Protection Jammer pods, Next Generation Radar Warning Receiver and associated equipment for Su-30 MKI Aircraft was accorded by DAC. This system will enhance the operational capabilities of SU-30 MKI and protect it from enemy radars and related weapon system while carrying out a mission against enemy targets protected by Air Defence systems.

DAC accorded AoN for procurement of 06 Advanced Light Helicopters (ALH) M (MR) for Indian Coast Guard to strengthen the Coastal Security and Surveillance in the coastal areas. It has also accorded approval for the overhaul of T-72 & T-90 tanks, BMP- and engines of Sukhoi fighter aircraft which will enhance the service life of these assets.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2080155>

THE ECONOMIC TIMES

Tue, 03 Dec 2024

3 warships and 1 submarine likely to be commissioned in a month: Top Navy official

Three warships and one submarine are likely to be commissioned in about a month, a top official of the Indian Navy said on Tuesday. Addressing a press conference, Vice Admiral Sanjay J Singh, Flag Officer Commanding-in-Chief of the Western Naval Command, said the three warships - INS

Nilgiri, INS Surat, INS Tushil - and submarine INS Vagsheer are expected to be commissioned in a month.

"We have got four vessels that are due for induction within the next one month," Singh said.INS Nilgiri is the first ship of Project 17A and was launched in September 2019, he said.

INS Surat is the fourth ship of Project 15B Destroyers which heralds a significant makeover of the P15A (Kolkata Class) Destroyers and is named after the commercial capital of the state of Gujarat.

INS Vagsheer is the sixth Scorpene Submarine of Project-75 and was launched in April 2022.INS Tushil is the last of the two vessels which are being built in Russia, he said.

"That (INS Tushil) is the last of the two vessels from abroad. We currently have 65 vessels under construction and 63 of them (are being built) in Indian shipyards," Singh said.

"These four vessels on the western seaboard are expected to be commissioned or delivered in about a month's time. After the delivery, we normally take a couple of weeks to prepare the ship for the commissioning ceremony," he added.

<https://economictimes.indiatimes.com/news/defence/3-warships-and-1-submarine-likely-to-be-commissioned-in-a-month-top-navy-official/articleshow/115940723.cms>

THE ECONOMIC TIMES

Tue, 03 Dec 2024

India to get indigenously designed nuclear attack submarines by 2036: Navy Chief

India will get its first indigenously designed nuclear attack submarines by 2036, with a government approval for two boats indicating faith in Indian capacity to design and manufacture complex defence platforms, navy chief Admiral Dinesh K Tripathi has said.

In the first official comments on the nuclear attack submarine programme (SSNs), the navy chief said that the first is likely to be delivered by 2036 and a follow on within two years. He added that as per current plans, the navy has a requirement for six such submarines.

"It (approval) indicates the government's faith in our capability to design these boats in house, as well as in the larger ecosystem. I have no doubt that apart from bringing combat capability, this will also galvanise the ancillary industries in the defence ecosystem," the navy chief said, adding that he has no doubts that the timeline for induction (2036-37) will be achieved.

India already has nuclear-powered and nuclear-armed submarines (SSBNs) under the Arihant class. The new nuclear attack submarines will be much stealthier and will be armed with conventional weapons. India will join a select club of nations including the US, Russia and China that have such capacity. The cabinet committee on security had cleared the Rs 35,000 crore acquisition in October, with a significant part of the work likely to be done by the private industry.

Unlike conventionally-powered submarines, nuclear attack boats have the ability to stay underwater indefinitely, giving the navy a unique capability to guard areas of interest and deter enemy movement. India has in the past operated nuclear attack submarines on lease from Russia.

Sources said that unlike the Arihant class of nuclear-armed submarines, the new attack boats will be fully designed in India without any foreign assistance. They added that all technologies required to construct the submarines, including a powerful miniaturised nuclear reactor, are available domestically and the new boats will have minimal foreign equipment onboard.

Sharing details of other submarine modernisation programmes, the navy chief said that the process to acquire six new Air Independent Propulsion (AIP)- equipped submarines is currently on and a selection has not been made. He added that commercial proposals for the contract are yet to be opened. This programme, also called P 75I, is seeing a keen competition between an MDL-TKMS combine and an L&T-Navantia offering.

The navy chief also shared that plans to acquire three additional Kalvari class submarines are in the final stages and a contract is expected to be signed with manufacturer Mazagaon Dockyard Limited within two months.

<https://economictimes.indiatimes.com/news/defence/india-to-get-indigenously-designed-nuclear-attack-submarines-by-2036-navy-chief/articleshow/115919913.cms>

THE ECONOMIC TIMES

Tue, 03 Dec 2024

Chinese military's new model for integrated training group drills reaches front lines: PLA daily

The Chinese army has achieved a "significant step" of taking the integrated combat readiness drills to the front lines as part of efforts to improve the training programme to familiarise the troops with modern warfare scenarios, the military-run PLA Daily reported.

The 'new model for integrated training group exercises' has reached the front lines, the PLA Daily citing Central Military Commission (CMC) - the overall military command, reported on Monday.

The People's Liberation Army (PLA) has achieved major progress in modernising its training programme as it seeks to boost combat readiness in modern warfare scenarios, according to the Chinese military's newspaper.

The new model for integrated training has been rolled out on the PLA front lines, including drills on different units working as a team and coordinated use of specific tactics in battle, the Hong Kong-based South China Morning Post reported, citing the report.

The next step was to make the training more realistic and closely aligned with real combat situations, leading to an overall improvement in military readiness and capability, the report said, citing CMC, which is chaired by President Xi Jinping.

China has been pushing to modernise its military, from weapons to war tactics, as it tries to narrow the gap with the United States and better prepare itself to tackle an increasingly hostile geopolitical scenario.

The quest has gained added urgency amid the war in Ukraine, progress in advanced and unmanned weapons, and the military use of cutting-edge technology, including artificial intelligence, prompting Beijing to focus on integrated operations by different branches of its armed forces, the Post said. Taking the integrated military training to the frontlines also holds significance to the

3488-km-long Line of Actual Control (LAC) with India. The two countries recently resolved their military standoff in eastern Ladakh. The standoff resulted in the freezing of their ties for over four years. Since he came to power, Xi, who heads all three power centres - the ruling Communist Party of China (CPC), the Presidency and the CMC - has carried out massive reforms integrating different military wings.

He has also emphasised real-time combat drills to improve their operational abilities to win local wars. In a report last week, the PLA Daily called for setting up a mechanism for close coordination among multiple military branches, the Post reported.

"No conflict will be able to be launched without requiring joint operations, and no victory will be gained without coordination. No single military branch can battle alone," according to the Daily's report.

Commenting on the modernisation of the training of the PLA, Chinese military analyst Fu Qianshao said, "The nature of warfare has already changed significantly and all military forces worldwide need to learn from the new tactics and combat models displayed in local conflicts, using the lessons of war to improve their equipment and training methods".

The future wars will undoubtedly include integrated operations, especially with the growing role of information technology, so it's crucial that all PLA branches become interconnected, with unified command and coordinated action, Fu was quoted as saying by the Post.

The next step for the PLA would be to strengthen its capabilities and increase coordination among its army, navy, air and rocket forces, as well as sharpen its network communication system, he said.

Military commentator and former PLA instructor Song Zhongping also underlined the collaborative aspect, saying: "Real war requires joint training as its foundation and core; it's not enough for a single branch or unit to carry out any combat mission alone."

He said the PLA training now has evolved towards joint exercises, which were key to testing and improving real combat capabilities. It was putting into practice the lessons learned from the US military and the Russia-Ukraine war, Song said.

Monday's edition of PLA Daily also reported an exercise conducted by an unspecified brigade of the Southern Theatre Command, which oversees military strategy in the contested South China Sea. The drill involved PLA air and ground forces working together in a combat-oriented scenario, the report said.

The PLA's joint operation capabilities have been on display during numerous exercises around Taiwan carried out by the Chinese military in recent months, virtually encircling the self-governing estranged island. China claims Taiwan as part of its mainland.

<https://economictimes.indiatimes.com/news/defence/chinese-militarys-new-model-for-integrated-training-group-drills-reaches-front-lines-pla-daily/articleshow/115933371.cms>

Karman Drones, TCL join hands to co-develop UAVs solutions

Drone-tech firm Karman Drones on Tuesday said it has signed a five-year strategic partnership with defence PSU Troop Comforts Ltd (TCL) for co-development and manufacturing of unmanned aerial vehicles across various categories.

The partnership aims to harness the expertise of both entities to design and develop Unmanned Aerial Systems (UAS) and Unmanned Aerial Vehicles (UAVs) solutions tailored to meet the evolving needs of the Indian Defence forces, paramilitary units, police organisations, central and state government organisations as well as the civil sector, the company said.

"We have partnered with TCL... This collaboration will enable us to develop advanced solutions for the Indian Defence forces and other stakeholders," said Pravan Shetty, Founder and CEO of Karman Drones.

TCL's partnership with Karman Drones will help advance India's defence manufacturing capabilities as a part of the "Make in India" policy, said TCL.

<https://economictimes.indiatimes.com/news/defence/karman-drones-tcl-join-hands-to-co-develop-uavs-solutions/articleshow/115934719.cms>

Fire-hit warship INS Brahmaputra brought to 'upright' position, will be back at sea: Navy official

Indian Navy's frontline warship INS Brahmaputra, which turned to a side and was damaged following a fire onboard more than four months ago, has been set "upright" and the guided missile frigate will be back at sea, a top official said on Tuesday.

Vice-Admiral Sanjay J Singh, Flag Officer Commanding-in-Chief, Western Naval Command, said the restoration plan of the warship will be chalked out after the Navy completes a full survey on the extent of damage caused to the vessel.

"The raging rhino (INS Brahmaputra) will rise again and will lead the charge for years to come. The first part of getting raging back on its feet has been achieved. She was 'uprighted' on November 2. On November 8, she was placed in the dry dock. They (Navy officials) have been carrying out damage assessment and initial repairs," he said in response to a question.

Vice-Admiral Singh was addressing the media on the eve of Navy Day (December 4). In late July, a major fire broke out onboard INS Brahmaputra at the naval dockyard in Mumbai. The warship was severely damaged and tilted heavily to one side following the fire.

Navy Chief Admiral Dinesh K Tripathi had then visited the naval dockyard and reviewed the sequence of events leading to the accident. Asked about the recent collision between Indian Navy submarine INS Karanj and fishing boat FV Marthoma off the Goa coast, he said the vessel suffered damage in the accident but it is operational.

"Obviously, where there is a collision between two vessels there will be an amount of damage. We have taken an assessment of the damage that has occurred and the repairs are in progress and the submarine remains operational," Vice-Admiral Singh emphasised.

On Monday, the Mumbai Police said the 'tandel' (captain) of FV Marthoma was booked in connection with the death of two persons following its collision with INS Karanj in the Arabian Sea off the coast of Goa on November 21.

The submarine suffered damage of more than Rs 10 crore, while the fishing boat sank due to the impact of the collision. Fishing boat Marthoma had 13 crew members and 11 of them were rescued in the search operation.

Vice-Admiral Singh said the Navy will continue with its internal inquiry into the collision and on completion of the probe, it will take corrective measures if and where required.

<https://economictimes.indiatimes.com/news/defence/fire-hit-warship-ins-brahmaputra-brought-to-upright-position-will-be-back-at-sea-navy-official/articleshow/115941358.cms>

THE ECONOMIC TIMES

Wed, 04 Dec 2024

India, UK convene second 2+2 Foreign and Defence Dialogue in New Delhi

The second India-UK 2+2 Foreign and Defence Dialogue convened in New Delhi on Tuesday, underscoring the growing strategic partnership between the two nations.

The Indian delegation was led by Piyush Srivastava, Joint Secretary, Europe West, Ministry of External Affairs, and Vishwesh Negi, Joint Secretary, International Cooperation, Ministry of Defence, according to the Ministry of External Affairs press release.

Representing the UK were Ben Mellor, India Director, Indian Ocean Directorate, Foreign, Commonwealth & Development Office, and Shimon Fhima, Director Strategic Programmes, Ministry of Defence.

Discussions revolved around the Comprehensive Strategic Partnership and highlighted the significance of sustained high-level engagement to advance the bilateral relationship.

Both delegations reviewed progress under the India-UK Roadmap 2030 and emphasized revitalizing the partnership by identifying new areas of collaboration, added the release.

Randhir Jaiswal, official spokesperson of the Ministry of External Affairs, posted on X (formerly Twitter), saying, "The second India-UK 2+2 Foreign and Defence Dialogue was held in New Delhi today. Co-chaired by Piyush Srivastava, Joint Secretary (Europe West) & Vishwesh Negi, Joint Secretary (International Cooperation) Ministry of Defence, India on the Indian side and Ben Mellor, Director Foreign, Commonwealth & Development Office & Shimon Fhima, Strategic Operations Director, Ministry of Defence on the UK side. Both sides reviewed progress made in

diverse areas of India-UK cooperation and discussed ways for further strengthening India-UK Comprehensive Strategic Partnership."

Key priorities included strengthening economic and trade ties with a focus on the early conclusion of a mutually beneficial Free Trade Agreement (FTA), enhancing defence and security cooperation--particularly in cyber and counter-terrorism--and fostering innovation in emerging technologies. Other areas of focus included clean energy, health, and expanding cultural, educational, and people-to-people linkages.

The dialogue also spotlighted significant progress in diverse sectors, marked by initiatives such as the Technology and Security Initiative, the UK-India Infrastructure Finance Bridge, the Electric Propulsion Capability Partnership, and advancements on the Defence Industrial Roadmap. Both sides acknowledged the importance of these initiatives in reinforcing collaboration and achieving shared objectives.

Additionally, the dialogue served as a platform to exchange views on global and regional developments. Both sides reiterated their commitment to a shared vision for peace, stability, and prosperity in a free, open, and inclusive Indo-Pacific. The emphasis on this vision underscores their joint strategic interests in addressing global challenges and fostering regional security.

The dialogue concluded with an agreement to hold the third edition in the UK in 2025 at a mutually convenient date, further solidifying the trajectory of their dynamic and evolving partnership.

<https://economictimes.indiatimes.com/news/defence/india-uk-convene-second-22-foreign-and-defence-dialogue-in-new-delhi/articleshow/115954131.cms>

THE ECONOMIC TIMES

Wed, 04 Dec 2024

Indian Navy Day 2024: Know its theme, significance, history and more

Indian Navy Day, observed annually on December 4, commemorates the valor and commitment of India's naval forces. This year marks the anniversary of Operation Trident, a landmark naval mission carried out during the 1971 Indo-Pak war that showcased the strategic brilliance of the Indian Navy.

In 2024, the Navy Day celebrations are set to take place in Puri, Odisha, with President Droupadi Murmu as the chief guest. Admiral Dinesh K. Tripathi, the Chief of Naval Staff, will host the event.

The ceremony will feature a grand display of the Indian Navy's technological advancements and operational capabilities, reaffirming its critical role in safeguarding India's maritime borders. Indian Navy Day 2024 theme.

This year's theme, "Strength and Power through Innovation and Indigenisation," emphasises the Navy's focus on enhancing defense capabilities through self-reliance and cutting-edge technology.

Operation Trident: A historical milestone

Indian Navy Day honors the success of Operation Trident, an audacious mission during the 1971 Indo-Pak war. On December 4, 1971, the Indian Navy launched a surprise attack on Karachi, crippling Pakistan's key port and asserting India's naval prowess. This operation is celebrated as a defining moment in India's military history.

Significance of Indian Navy Day

The day recognizes the pivotal role of naval officers and personnel in defending the nation's maritime interests. It highlights their contributions to maintaining peace in the Indian Ocean Region, ensuring the security of critical trade routes, and fostering international maritime cooperation.

Celebrations and tributes

Indian Navy Day is marked by a series of events:

- Flag-hoisting ceremonies led by senior naval officers.
- Tributes to veterans and retired personnel for their service and sacrifices.
- Public demonstrations showcasing the Navy's capabilities, including modern ships, submarines, and aircraft.

This year's celebrations aim to inspire pride in the commitment of the Indian Navy to protect India's waters while promoting innovation and self-reliance.

<https://economictimes.indiatimes.com/news/defence/indian-navy-day-2024-know-its-theme-significance-history-and-more/articleshow/115954042.cms>

THE ECONOMIC TIMES

Tue, 03 Dec 2024

India pivots from Russia to US for cutting-edge weapons

India has sharply reduced orders for defense equipment with Russia and is now buying more from Western suppliers, officials said, a significant policy shift for a nation traditionally reliant on arms from Moscow.

India and Russia's plans to jointly develop and manufacture helicopters and advanced fighter jets were shelved some time ago, according to senior Indian officials with direct knowledge, who asked not to be identified because the discussions are private.

A separate proposal to lease a nuclear-powered submarine from Russia to train Indian crew is also unlikely to move forward, they said, noting that the South Asian nation is building its own vessels.

Two warships and batteries for an anti-missile shield, which were ordered prior to the war in Ukraine, are the only outstanding items New Delhi has yet to receive from Moscow.

India's ministries of defense and external affairs didn't reply to requests for comment. India, the world's biggest importer of weapons, has been buying less and less from Russia. Only 36% of India's arms imports came from Russia last year, down from 76% in 2009, according to a March report from the Stockholm International Peace Research Institute, an independent think tank that studies conflict, weapon sales and disarmament.

India's move to wean itself off Russian weapons underscores Prime Minister Narendra Modi's efforts to steadily reduce its dependence on Moscow, even as his government continues to buy cheap energy from Russia and provide diplomatic support to Vladimir Putin.

India at the same time has moved closer into the US defense orbit, providing an anchor for the relationship just as Donald Trump comes into office threatening higher tariffs.

New Delhi's shift from Russia has helped US-based suppliers. According to the SIPRI, India is now buying more from Western companies and trying to build homemade weapons with support from the US and France. Over the past two decades, Washington has eased restrictions barring developing countries from accessing advanced technology. Since 2018, India has inked contracts worth nearly \$20 billion for US-made products, according to a report from the US Congressional Research Service.

In October, the South Asian country green-lit a more than \$3 billion deal for 31 long-range drones made by US defense giant General Atomics. India's state-owned Hindustan Aeronautics Ltd. and General Electric Co. are also close to signing an agreement to jointly manufacture an advanced version of jet engines for the next generation of light-combat aircraft, according to Indian officials who asked not be named as discussions are private. The authorities agreed on terms of the partnership during Modi's state visit to the US last year.

Russian-made weapons are often cheaper than Western ones. But they need frequent repairs, which affects their desirability and makes them costlier in the long run, said another senior Indian official, who asked not be named to discuss sensitive information.

"India has slowly shifted to Western-origin platforms because the military is increasingly comfortable with such technology," said Anit Mukherjee, a senior lecturer at King's College London who specializes in India's military and foreign policy.

The pivot away from Moscow is a defining feature of Modi's foreign policy. It underscores India's efforts to balance ties with Russia, which sells cheap oil to New Delhi, and the US, which is helping ramp up defense manufacturing and add jobs in the South Asian nation. The war in Ukraine has accelerated India's reduction in buying Russian weapons. A delay in supplying anti-missile shields is proof of Russia's strained capacity, said Sushant Singh, a lecturer of South Asian studies at Yale University.

Russia's ties with China have also further complicated the equation. "Russian defense industries' reliance on Chinese electronics is problematic and a red flag for India," said Mukherjee. Even so, New Delhi and Moscow are jointly manufacturing rifles and missiles in India, and Russia still remains the South Asian nation's largest supplier of military hardware. The bulk of imports, however, comprises spare parts to keep legacy equipment functional. That includes everything from basic rifles to army tanks and India's primary fighter jet. "These will remain in service for decades and India will need spare parts and ammunition from Russia for a long time," said Singh.

New Delhi's fighter fleet is dropping steadily as it faces off against two hostile neighbors — China and Pakistan. It may need help from Moscow there too: India's homemade fighters program stalled after US-based GE failed to supply jet engines. In addition, India continues to be dependent on Russia for nuclear capabilities.

"Russia remains the only country which offers its nuclear submarines to India," said Mukherjee. "India's partnership with Western countries will be incomplete until both sides find a way to talk about nuclear issues."

<https://economictimes.indiatimes.com/news/defence/india-pivots-from-russia-to-us-for-cutting-edge-weapons/articleshow/115928326.cms>

Hindustan Shipyard partners with Kongsberg Maritime for Indian Navy's fleet support ships programme

Hindustan Shipyard Limited (HSL) has entered into a significant partnership with Norwegian company Kongsberg Maritime to enhance the operational capacity of the Indian Navy through advanced replenishment-at-sea (RAS) technology. This collaboration comes as part of the ongoing development of the Indian Navy's Fleet Support Ships (FSS) programme, a crucial initiative aimed at extending the Navy's operational range and improving its logistical support capabilities.

The Fleet Support Ships (FSS) Programme

The FSS are a new class of large replenishment vessels designed to provide vital logistical support to naval operations, particularly during extended missions at sea. With a displacement of over 40,000 tons, these ships will carry and deliver fuel, water, ammunition, and supplies to Navy warships, enabling them to conduct sustained operations far from port. The FSS will also serve a secondary but equally important role in humanitarian aid and disaster relief operations, providing essential support during natural calamities or emergencies. The Indian Navy's strategic reach and mobility will be greatly enhanced, as the ships ensure continuous replenishment without the need to return to shore.

Kongsberg Maritime's Role

Kongsberg Maritime's contract with HSL will see the Norwegian company supply its advanced electric Replenishment-at-Sea (RAS) technology for the five FSS being constructed. This technology is designed to improve the efficiency, safety, and reliability of logistical operations at sea, which is crucial for the Navy's readiness during long-term deployments.

According to Lisa Edvardsen Haugan, President of Kongsberg Maritime, "Our RAS technology supports critical operations for many of the world's navies, and through the development of our electric system, we offer mission-critical capability enhancing operational readiness." The electric RAS system will not only enhance the operational capabilities of the ships but also provide a sustainable and responsive solution for the Indian Navy.

Kongsberg Maritime's electric RAS system will contribute to the modernization of the Indian Navy, providing faster, safer, and more efficient replenishment procedures. Haugan highlighted the importance of this contract for Kongsberg, noting, "To have secured the contract to supply our electric Replenishment-at-Sea systems to the Indian Navy's Fleet Support Ships programme is significant for Kongsberg Maritime, and we are delighted to have been selected for this major shipbuilding programme."

The Importance of FSS in Naval Operations

The primary function of the Fleet Support Ships is to replenish and resupply warships at sea, ensuring the Indian Navy can maintain a sustained presence in critical maritime regions without the need to return to port for essential supplies. This capability is particularly valuable in the context of the Navy's "blue water" operations, which involve long-range, sustained naval presence far from home ports. The FSS will allow the Navy to operate in remote or hostile environments without logistical constraints, enhancing the Navy's strategic reach.

The FSS will be equipped with the latest technology, including Kongsberg Maritime's electric RAS system, to provide an efficient and safe resupply process. This system will be instrumental in ensuring that the Navy can operate with high endurance, as it reduces the time and risks associated with traditional replenishment procedures. The technology is also designed to improve safety, which is vital for naval operations where time-sensitive operations and dangerous conditions often prevail.

In addition to their military applications, the FSS will be equipped for Humanitarian Aid and Disaster Relief (HADR) operations. These ships can be deployed for evacuation of personnel during emergencies or to deliver relief materials quickly to disaster-stricken areas. This dual-purpose functionality enhances the Navy's capacity to respond to national and regional crises, such as the 2004 Indian Ocean tsunami, where the Navy played a crucial role in disaster response.

Indigenous Development and Strategic Collaboration

The development of the FSS programme is a significant step toward bolstering India's indigenous shipbuilding capabilities. With the majority of the equipment being sourced from domestic manufacturers, the project aligns with the Indian government's "Aatmanirbhar Bharat" (self-reliant India) initiative. Annette Holte, Country Manager – India at Kongsberg Maritime, emphasized the importance of this collaboration, saying, "This partnership underscores our commitment to the 'Make in India' initiative, as we continue to develop a robust supply chain and local capabilities."

The Indian government approved the acquisition of the five Fleet Support Ships in August 2023 at an estimated cost of Rs 19,000 crore. The ships are scheduled to be delivered starting in mid-2027, with the keel-laying ceremony for the first FSS having been held in November 2024 at Hindustan Shipyard, Visakhapatnam.

Bottomline

The electric Replenishment-at-Sea system developed by Kongsberg Maritime will enhance the efficiency and safety of supply operations at sea, ensuring that India's Fleet Support Ships are well-equipped to support long-duration missions. By bolstering its logistical capabilities and expanding its strategic reach, the Indian Navy is positioning itself to respond effectively to both defence and humanitarian challenges in the years to come.

<https://www.financialexpress.com/business/defence-hindustan-shipyard-partners-with-kongsberg-maritime-for-indian-navys-fleet-support-ships-programme-3683084/>

The Tribune

Wed, 04 Dec 2024

US approves sale of helicopter equipment to India

India is set to upgrade its fleet of MH-60R multi-role helicopters, boosting its submarine-hunting capabilities. The outgoing Biden administration has approved the sale of advanced equipment and supplies to the Indian Navy at an estimated cost of \$1.17 billion (approximately Rs 10,000 crore), notifying the US Congress of its decision.

India initially procured 24 MH-60R helicopters under a \$2.6 billion Foreign Military Sales deal, with the first batch inducted earlier this year. The new package includes advanced systems such as

30 multifunctional information distribution system-joint tactical radio systems, external fuel tanks, infrared systems, ammunition and data transfer systems.

The proposed upgrades will also provide India with a joint mission planning system (JMPS), test equipment, spare parts, depot-level repair capabilities and software development. Additionally, the deal includes US government and contractor engineering, technical and logistics support services.

The US Defence Security Cooperation Agency (DSCA) emphasised that the sale aligns with US foreign policy and security objectives by strengthening the strategic partnership with India. The equipment will enhance India's role as a stabilising force in the Indo-Pacific and South Asia regions, contributing to political stability, peace and economic progress.

The Biden administration's approval comes weeks before its term ends, with President-elect Donald Trump set to take office on January 20, 2025. The deal reflects sustained US commitment to bolstering India's defence capabilities as a key partner in the region.

<https://www.tribuneindia.com/news/india/us-approves-sale-of-helicopter-equipment-to-india/>

THEWEEK

Tue, 03 Dec 2024

What are German-made HX-2 Karma kamikaze drones, set to join the battle in Ukraine

German defence company Helsing has started production of AI-equipped unmanned aerial vehicles (UAVs), called HX-2 Karma kamikaze drones, for supplying to Ukraine.

"HX-2 is already in production and the core technology is currently deployed in Ukraine," a release from the company read.

According to the company, the advanced on-board AI enables full electronic warfare and jamming resistance and the drones can also assemble into swarms, controlled by single human operators.

With a flying range of 100 km and speed of upto 220 km/h, HX-2 drones can carry a payload of 5kg. Combining speed, range, and sophisticated electronic warfare capabilities, HX-2 Karma kamikaze drones are capable of hitting targets at a considerable distance.

According to media reports, the drone's AI features help it navigate tough terrains even in difficult climatic conditions. Once it identifies a target, it can strike it even if the communication is lost, using a homing system used at the final part of the flight, although the human operator remains fully in control of the "critical decisions."

"With HX-2, we are creating a new smart effector category that combines mass, autonomy and precision. Individual HX-2s can reliably engage armored targets in highly contested environments. When deployed along borders at scale, HX-2 can serve as a powerful counter-invasion shield against enemy land forces," Niklas Kohler, co-founder of Helsing, has been quoted as saying.

The company plans to produce 1,000 drones per month from January 2025 and increase production volumes to 10,000 units per month in the medium term. German Defense Minister Boris Pistorius confirmed that his country will soon supply Ukraine with 4,000 high-tech attack drones.

Specifically designed for anti-tank and anti-structure operations, the supply of these "loitering munitions" is set to significantly boost Ukraine's areal defence capabilities even as Russian authorities have been repeatedly stating that pumping Ukraine with weapons will not reduce Russia's determination or change the course of the military operation.

<https://www.theweek.in/news/defence/2024/12/03/what-are-german-made-hx-2-karma-kamikaze-drones-set-to-join-the-battle-in-ukraine.html>



Mon, 02 Dec 2024

China-Russia joint patrols over Asia-Pacific: Routine drill or strategic signal?

The Russian defense ministry clarified that the recently-held joint patrols of the Russian Aerospace Forces and the Chinese People's Liberation Army Air Force in the Asia-Pacific region were just a routine exercise.

According to media reports, Chinese H-6K and Russian Tu-95MS strategic bombers, accompanied by fighter jets, conducted an eight-hour patrol over the Sea of Japan, East China Sea, and the western Pacific Ocean.

This is the first time China employed the H-6N strategic bomber in the patrol.

The Russian ministry claimed that the flights of both the countries did not violate the airspace of any foreign country, and added that the exercise was not directed at any specific nations.

During the maneuvers, Russian aircraft landed and took off from an airfield in China. The crew of the Tu-95MS strategic missile carriers carried out aerial refueling as part of the exercise.

China too clarified that this was a routine exercise.

"The joint Chinese-Russian strategic air patrol is a routine process in the implementation of the annual cooperation plan. It is not directed against third countries and has nothing to do with the current international and regional situation," a Chinese defense official has been quoted as saying, according to news agency TASS.

According to Chinese military expert Zhang Junshe, the Sea of Japan, East China Sea, and the West Pacific airspace are considered the 'doorsteps' of China and Russia, and hence it is totally reasonable for both countries to conduct such a joint patrols, reported Global Times.

There have been suspicions that the move is aimed at countering the plans of the US to deploy intermediate-range missiles in Japan.

<https://www.theweek.in/news/defence/2024/12/02/china-russia-joint-patrol-over-asia-pacific-routine-drill-or-strategic-signal.html>

अब स्वदेशी ड्रोन नागास्त्र-1 से सटीक निशाना साधेगी सेना; भारत का अपना पहला मानव-पोर्टेबल आत्मघाती हथियार

स्वदेशी आत्मघाती ड्रोन प्रणाली 'नागास्त्र-1' से सेना अब दुश्मन पर पहले से और सटीक निशाना लगाने में सक्षम होगी। नागपुर की सोलर इंडस्ट्रीज ने इसे तैयार किया है और सेना को 480 नागास्त्र-1 सौंपे हैं।

भारत का अपना पहला मानव-पोर्टेबल आत्मघाती ड्रोन

नागास्त्र-1 भारत में अपनी तरह का पहला मानव-पोर्टेबल आत्मघाती ड्रोन है, जो सैनिकों की जान को खतरे में डाले बिना लॉन्च पैड्स, प्रशिक्षण शिविरों और घुसपैठियों पर सटीक निशाना लगाने के लिए बनाया गया है। भारतीय सेना ने नागास्त्र-1 को लक्ष्य के ऊपर मंडराने की क्षमता के कारण लोड्टरिंग म्यूनिशन नाम भी दिया है। इसमें 75 फीसदी से अधिक सामग्री स्वदेशी है।

एक नजर खासियत पर

इस ड्रोन की रेंज लगभग 30 किलोमीटर है और ये दो मीटर की सटीकता के साथ जीपीएस-सक्षम सटीक हिट करने में सक्षम है। न कम ध्वनिक संकेत प्रदान करता है, जिससे 200 मीटर से अधिक की ऊंचाई पर इसका लगभग पता नहीं चलता है। न यह ड्रोन दिन और रात्रि निगरानी कैमरों से लैस है और छोटे लक्ष्यों को बेअसर करने के लिए 1 किलो का उच्च विस्फोटक वारहेड ले जा सकता है।

<https://www.amarujala.com/india-news/now-the-army-will-target-with-precision-using-indigenous-drone-nagastra-1-india-s-first-man-portable-suicide-2024-12-04>



Tue, 03 Dec 2024

Rhino Shakti Op Logistics Seminar focuses on Infrastructure, tri-service integration, tech-driven solutions for border areas

The ministry of defence conducted an operational logistic seminar called 'Rhino Shakti' at Narangi Military Station, in Assam on Tuesday.

The seminar was also available for viewing to a larger audience in the various formation headquarters across the country over the hybrid mode.

The aim of the seminar was to have a coordinated approach between various civil and military stake holders to facilitate creation and optimal utilisation of infrastructure and expertise to achieve mutual objectives, according to an official statement."The two days seminar provided contextual inputs on multi use, cost effective, efficient, resilient and sustainable efforts along the border areas," read the statement.

Rhino Shakti Operational Logistics Seminar concluded at Narangi Mil Stn (2-3 Dec). The hybrid event synergized civil-military efforts for sustainable & resilient logistics.

Having a focus on harnessing national initiatives and global best practices thereby enhancing real time informed decision making by military stakeholder for furtherance of national objectives.

The seminar also laid emphasis on the development of operational logistic infrastructure along the border areas, triservice logistic integration, implementation of advance technology for predictive modeling of military logistic operations thereby aiding the formulation of future joint logistic strategies.

"It aimed at synergizing the efforts of civil and military stakeholders to augment the military logistic capability. It also focused on bridging of strategic gaps with special emphasis on building a robust framework of collaboration between civil and military stakeholders while accentuating on dual use infrastructure, connectivity & survivability to enhance logistic capability & ensuring swift, efficient and cost effective responses to national security challenges," the statement added.

Eminent serving and retired speakers from the Army including speakers from Operational Logistics Directorate, IDS, USI, Academia, Industry as also from Niti Aayog, North Eastern Railways, NEEPCO, NEC and renowned Media House spoke on the diverse subjects having implications over long term security and logistic sustenance in the region.

<https://www.aninews.in/news/national/general-news/rhino-shakti-op-logistics-seminar-focuses-on-infrastructure-tri-service-integration-tech-driven-solutions-for-border-areas20241203231741/>

ThePrint

Tue, 03 Dec 2024

How India's 1st stealth technology created at IIT-Kanpur promises big boost to defence capabilities

India's first indigenously developed stealth initiative, created by scientists at IIT-Kanpur, marks a significant advancement in stealth technology for defense applications. Experts believe it will enhance the operational capabilities of India's armed forces and bolster their ability to maintain strategic superiority, thereby strengthening national security.

Launched in November, the Anālākṣhya Metamaterial Surface Cloaking System is a textile-based broadband metamaterial microwave absorber which offers near-perfect wave absorption across a broad spectrum, significantly enhancing stealth capabilities against Synthetic Aperture Radar (SAR) imaging.

Simply put, this innovation is a camouflage technology that will help the defence forces dodge satellite detection and provide effective protection from missiles that use radar guidance. Once commercially viable, it also promises non-military applications.

ThePrint explains the new technology and its applications:

What it is

Air Vice Marshal Praveen Bhatt—Managing Director and CEO of Meta Tattva Systems Pvt Ltd, the industry partner for this project—said that the Anālākṣhya Metamaterial Surface Cloaking System is a comprehensive multi-spectral camouflage system, which is effective in visual, near-infrared, thermal infrared (IR), and radiofrequency spectrum.

A metamaterial uses small structures to create resonances and interact strongly with radiation.

“This technology uses such properties to create strong absorption over broadbands of frequencies. The biggest challenge was to create the absorption in thin layers compared to the wavelength to ensure microwave stealth,” Bhatt said.

He said that the inclusion of emissivity control structures, and paints yield the desired performance against thermal infrared imaging.

Experts said that this technology—which will eventually be developed into multiple end-use products like cloaks, asset covers, clothing etc—will give a major boost to the Indian defence services.

Lieutenant General Cherish Mathson (retd), former General Officer Commanding-in-Chief, said that the biggest threat to military movements was the SAR. He said that developments in stealth technology—like the latest development from IIT-Kanpur—can greatly assist defence applications.

“When we realised in 2019 that the biggest threat to military movements is SAR, it was unbeknownst to us that the teams at IIT-K had already developed this ground-breaking invention,” Mathson said.

But the technology also holds promise for non-military applications.

Bhatt said that this technology will be valuable in environments requiring protection against microwave radiation, effective EMI (Electromagnetic Interference) shielding, and improved electromagnetic compatibility (EMC).

Some of the areas where the technology could be useful are wearable medical devices to enhance signal accuracy by shielding against external electromagnetic noise; enhancement of worker safety by developing it as protective cloaks for workers on mobile phone towers and masts to shield against prolonged microwave radiation exposure; and in test labs by providing radiofrequency (RF) shielding in testing environments to protect sensitive equipment during calibration.

Indian-made stealth technology

While the use of metamaterial for its camouflaging abilities has been experimented with for the first time by IIT-Kanpur, research around this technology has been happening in many countries.

However, scientists claim that despite early initiatives in the field of metamaterials, limited success has been achieved, even by advanced nations, in mitigating the SAR challenge from the military satellites using RF-wide bands.

Researchers from IIT-Kanpur said that Anālakṣhya offers near-perfect wave absorption across a broad spectrum, significantly enhancing the ability to counter SAR imaging. It also provides protection from missiles that use radar as guidance.

“Tailored for modern warfare, this cutting-edge innovation strengthens operational capabilities, providing India’s armed forces with advanced tools to maintain strategic superiority and ensure national security,” a senior scientist at IIT-Kanpur said, requesting anonymity.

In a statement, IIT-Kanpur said that the design is tailored for “operational imperatives, making it a crucial asset in modern warfare and surveillance.”

“The technology underwent extensive laboratory and field testing between 2019 and 2024, proving its efficacy across diverse conditions,” the institute said in the statement.

How does SAR foil military operations?

SAR satellites are powerful military tools that help locate enemies and decide engagement strategies. The SAR satellites are designed to penetrate conditions like thick clouds and the night sky to provide clear images of military assets in any part of the world.

National Aeronautics and Space Administration (NASA) documents explain that unlike optical imagery, which is a passive data collection technique based on emitted energy, SAR imagery is created from the reaction of an emitted pulse of energy with physical structures (like mountains, forests, and sea ice) and conditions like soil moisture.

The SAR technology is extensively used to study Antarctic icebergs, track oil spills, and map wetlands. However, as this technology is gaining popularity, it is also making it increasingly difficult for armed forces to conceal assets and avoid military movement detections.

Bhatt said that India's innovation comes at a time when the relevance of SAR-enabled ISR (intelligence, surveillance, and reconnaissance systems) is evident in global conflicts.

“For instance, in the Ukraine-Russia war, despite being an inferior force, Ukraine has effectively leveraged SAR-based intelligence from the western systems to target and disrupt Russian operations. This has underscored the immense power of ISR and the urgent need for effective countermeasures,” he said.

<https://theprint.in/science/how-indias-1st-stealth-technology-created-at-iit-kanpur-promises-big-boost-to-defence-capabilities/2384991/>

ThePrint

Tue, 03 Dec 2024

AIP submarines to new warships & focus on SLBM, how Pakistan Navy is carrying out ‘surprising’ expansion

December 4 is a dark day in Pakistan's naval history. Way back on that day in 1971, the Indian Navy's strike group under Operation Trident targeted the Karachi Port.

While India saw no losses, Pakistan ended up losing a minesweeper, destroyer, another ship carrying ammunition, and fuel storage tanks at the port. Another destroyer was also damaged and eventually scrapped.

That was the first time an anti-ship missile came to be used in the region. India celebrates 4 December as Navy Day.

Over five decades later, ahead of Navy Day, Indian Navy chief Admiral Dinesh Tripathi candidly acknowledged the “surprising” naval expansion of Pakistan and took a dig, saying that Islamabad was choosing “weapons over welfare”.

However, he underlined the challenges, saying that the Indian Navy was also tweaking its operational plans, considering the expansion.

Under focus is the Pakistan Navy's ambitious plan to be 50-ship strong in the next decade. Incidentally, most ships would be modern state-of-art surface warships and submarines.

“The Pakistan Navy has cut a lot of new deals, encouraged by the People’s Liberation Army Navy (PLAN). Lots of collaborations are happening there. They are also catching up on SLBMs (9Ship launched Ballistic Missile),” Wajahat Khan, a senior fellow at the Atlantic Council, told ThePrint.

With the Pakistan Navy left behind by the other two Army services, he said, a catch-up burst was due.

“This catch-up burst has come thanks to the Chinese and some new European refits. Pakistan is finally waking up to the Indo-Pacific theatre and the WIOR (Western Indian Ocean Region),” he said.

It was in October 2020 that the then-outgoing Pakistan Navy chief Admiral Zafar Mahmood Abbasi detailed measures he enacted to modernise the Navy. He then spoke about expanding the Navy to more than 50 warships, more than doubling major surface combatants to 20 and plans for six additional large offshore patrol vessels, as reported by DefenseNews.

The former chief then also spoke about the transfer of a Chinese Yuan-class submarine to train Pakistani crews for its eight Hangor subs, the development of the hypersonic P282 ship-launched anti-ship/land-attack ballistic missile, and the replacement of the P-3C Orion patrol aircraft with 10 converted commercial jets, with the order for the first already placed, and the acquirement of the medium-altitude, long-endurance unmanned combat aerial vehicles as well as 20 indigenous gunboats, which will be commissioned by 2025.

Besides, he spoke about establishing the Naval Research and Development Institute to nurture indigenous design talent. The centre is making the Jinnah-class frigate, Hangor-class subs, UAV jammers, directed-energy weapons, underwater sonar surveillance coastal defence systems, unmanned underwater vehicles, and unmanned combat aerial vehicles.

Pakistan Navy modernisation kicked off in 2015

The foundation for the Pakistan Navy’s modernisation process was laid in 2015 when Pakistan signed a USD 5 billion agreement with China for procuring eight Type 039B-based Hangor II submarines.

Of the eight, the first four will be built in China, whereas the remaining will be made in Pakistan in collaboration with Beijing.

The submarine is an export variant of the Chinese Type 039A/41 attack submarine—equipped with an Air Independent Propulsion (AIP) system, besides heavyweight torpedoes and anti-ship cruising missiles.

The first of the eight submarines was delivered in April this year, with the entire contract to be executed by 2030.

Besides the Chinese weapons, the submarine will also fire the nuclear-capable Babur-3 cruise missile, with a range of over 400 kilometres.

Already, the Pakistan Navy operates two Agosta 70 (Hashmat class) and three Agosta 90B (Khalid class) submarines.

Turkey has upgraded the three Agosta 90B under a contract inked in 2016, giving the submarines a fresh lease of life and making them more potent.

Under the upgrade, sonar suites, periscopes, command and control systems, naval data distribution systems, converters, steering control systems, chilled water systems, and radar and electronic support systems have all been replaced.

China is upping Pakistan's naval powers to keep India engaged, it is believed.

Besides the submarines, Pakistan has received the Type 054A/P frigates, built by China's Hudong Zhonghua Shipbuilding yard in Shanghai.

Pakistan became the ship design's first foreign customer under a 2017 deal for two Type 054A/P frigates, with two more ordered in 2018 and deliveries that began in 2021.

The Type 054A/P is a Pakistan-specific variant, equipped with the SR2410C long-range and Type 517/SUR17B air surveillance radars.

Currently, Pakistan's four F-22P Zulfiqar-class frigates—earlier incapable of facing modern missile threats—are understood to be going through an upgrade. It was not immediately clear if China or Turkey was doing the upgrade.

In 2018, Pakistan also started receiving deliveries of the Turkish-designed Babur-class corvettes on order from Turkey.

The Pakistan Navy, in September last year, received the first of four Babur-class corvettes from ASFAT, the Turkish Ministry of Defence's wholly-owned subsidiary.

Based on the MILGEM Ada-class corvette design for the Turkish Naval Forces Command, Babur-class platforms for the Pakistan Navy differ mainly in the combat suite equipment.

Pakistan and Turkey are also collaborating on the Jinnah-class frigate. Construction of the six planned frigates will begin after the completion of work on the Babur-class corvettes at the state-owned Karachi Shipyard and Engineering Works in Pakistan.

There are multiple other upgrade and acquisition programmes that the Pakistan Navy is pursuing. Incidentally, Pakistan has also procured offshore patrol vessels from Romania.

Pakistan has this month also carried out the test of the SMASH SLBM (P282)—an advanced ship-launched ballistic missile (SLBM) boasting a range of 350 km and anti-access/area-denial (A2/AD) capabilities.

The National Interest reported that the missile tested from a Zulfiqar-class frigate potentially includes Chinese CM-401 anti-ship technology, imparting supersonic manoeuvrability and precision targeting for sea and land threats.

<https://theprint.in/defence/aip-submarines-to-new-warships-focus-on-slbm-how-pakistan-navy-is-carrying-out-surprising-expansion/2385450/>

Science & Technology News



Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 03 Dec 2024

A novel antenna design proposed by scientists can measure faint cosmological radio-frequency signals

**EU Sees India as a ‘Natural Partner’ in Space Exploration and Security:
EU Ambassador**

**3rd India Space Conclave Highlights India’s Rising Role in Global Space
Collaboration**

Scientists at the Raman Research Institute, Bangalore, have come up with a novel antenna design which can perform sky measurements 2.5 - 4 Gigahertz (GHz), a frequency range with the best possibility of detecting the faint Cosmological Recombination Radiation (CRR) signals. These elusive and undetected signals hold vital clues capable of improving our understanding of the thermal and ionization history of the Universe.

Our universe is about 13.8 billion years old. Soon after the Big Bang, the infant Universe was an extremely hot and dense place. So hot, that matter could not exist as atoms. It instead broke down into electrons, protons, and other light nuclei (Helium, Lithium). Also, co-existing with matter in the early Universe is radiation. Today we observe this radiation as the Cosmic Microwave Background (CMB). This CMB is capable of retaining crucial information about the cosmological and intervening astrophysical processes by means of distortions in its spectral shape.

One such distortion comes from the process of the formation of the first atoms in the early Universe over the Epoch of Recombination. This period is characterised by the expansion and gradual cooling of the Universe which resulted in ordinary matter (Baryonic matter) to enter into a transition phase -- from a fully ionized primordial plasma into mostly neutral atomic hydrogen and helium atoms. This process is accompanied by the emission of photons or radiation, which is termed as Cosmological Recombination Radiation (CRR). This forms an additive distortion to the underlying CMB spectrum.

The detection of the never-before-detected CRR, which is nine orders of magnitude (1 part in a billion) fainter than the CMB which measures about 3-degree Kelvin (-270 degree Celsius, the temperature of deep space), will be an important confirmation of our understanding of the thermal and ionization history of the Universe. A detailed measurement of the CRR will provide the only way to experimentally measure the abundance of helium in the Universe before more helium starts forming in the cores of the stars.

Due to the weak and elusive nature of CRR, the challenge before the scientific community is to design highly sensitive instruments that can aid in their detection.

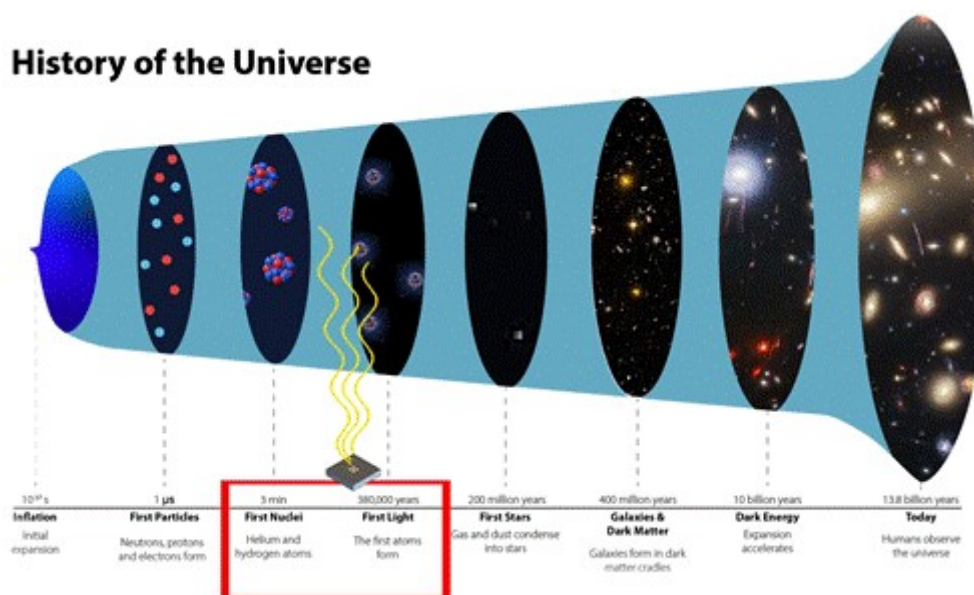
As a first step towards detection of such a signal, a group of researchers from Bengaluru have designed a unique ground-based broadband antenna capable of detecting signals as faint as one part in 10,000.

Researchers Mayuri Rao and Keerthipriya Sathish from Raman Research Institute (RRI), an autonomous institute of the Department of Science and Technology (DST), Government of India, and their collaborator Debdeep Sarkar from the Indian Institute of Science (IISc), have come up with an antenna design which can perform sky measurements between 2.5 - 4 Gigahertz (GHz), the frequency range identified to be best suited for CRR detection.

“For the sky measurements we plan to perform, the broadband antenna offered us the highest sensitivity when compared to other antennas designed for the same bandwidth. The metric of being frequency-independent over the wideband and ensuring smooth frequency performance is unconventional, something only a custom design, such as ours, could achieve. An off-the-shelf wideband antenna just won’t work,” said Keerthipriya Sathish, lead author of the paper and Research Scientist at RRI.

A fantail antenna has been proposed as it has a radiation pattern with the same shape across frequencies with just a +/- 1% variation in its characteristics. This antenna is a dual polarised dipole antenna with four arms and each arm shaped in the form of a fantail. What makes a fantail antenna unique is that using its custom design, the antenna stares perfectly at the same patch of the sky over its full operational bandwidth of 1.5 GHz (2.5 to 4 GHz) which is important in being able to separate spectral distortions from galactic foregrounds.

Weighing 150 grams, the square box-shaped antenna measures 14cm x 14cm. The top flat substrate is a low loss dielectric on which the antenna is etched in copper and the bottom is an aluminium ground-plate. Sandwiched in between these two plates is a radio-transparent, thick foam layer that houses the antenna’s connectors with the receiver base.



“The antenna has a sensitivity of around 30 millikelvin (mK) across the 2.5-4 GHz frequency range, enabling it to detect very small temperature variations in the sky. Even before scaling it to an array, this antenna will enable exciting first science results once integrated with its custom receiver. We plan to study a reported excess radiation in the sky from a previous experiment at 3.3 GHz, which has been attributed to exotic physics including Dark Matter annihilation. Such

experiments with this antenna will help inform improvements in the antenna and experiment design to go all the way to the sensitivity needed for a CRR detection” said Mayuri Rao, faculty, RRI.

The researchers said that an antenna array will be deployed in radio-quiet locations, that is, where there is minimal or no radio frequency interference. The design of this planar antenna is such that it is easily fabricated using methods similar to those used in Printed Circuit Board (PCB) printing. Thus, this design offers high machining accuracy and consistency during replication for multiple-element arrays, is portable and easily deployable.

Using techniques adopted in this antenna design, the trio are already planning improvements that can take them closer to achieving their formidable goal of 1 part per billion sensitivities.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2080190>



Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 03 Dec 2024

Dr. Jitendra Singh Invites Israeli Startups to Collaborate on National Quantum Mission

Two leaders discussed collaboration in StartUps, particularly in Space and Quantum Technology. They also discussed collaborative innovation initiatives in agriculture and health sectors

India’s Scale Meets Israel’s Innovation: A Partnership for Progress, Says Minister

Israel Minister’s India Visit Strengthens Innovation Ties: Focus on Clusters, Collaboration, and Cutting-Edge Pilots

Israel's Industry & Economy Minister Nir Barkat, currently on India visit, today called on Union Minister of State (Independent Charge) for Science and Technology; Earth Sciences, Minister of State PMO, Department of Atomic Energy, Department of Space, Personnel, Public Grievances and Pensions, Dr. Jitendra Singh.

Two leaders discussed collaboration in StartUps, particularly in Space and Quantum Technology. They also discussed collaborative innovation initiatives in agriculture and health sectors.

The Israel Minister was accompanied by a high-level official delegation.

Dr. Jitendra Singh spotlighted the transformative potential of India’s National Quantum Mission, envisioning it as a cornerstone of the country’s technological aspirations. He invited Israeli startups, known for their pioneering work in quantum computing, to partner with Indian institutions to co-develop critical quantum technologies. “India and Israel can supplement each other in this domain—India with its large market, manpower, and opportunities, and Israel with its cutting-edge innovation,” he said.

India's National Quantum Mission aims to harness quantum technologies to bolster sectors like communication, cryptography, and computing. Israeli startups and researchers, Dr. Jitendra Singh noted, could play a vital role in co-developing critical technologies, leveraging their experience for mutual benefit.

Dr. Jitendra Singh emphasized the remarkable growth in India's space ecosystem, attributing the rise in space startups to the government's forward-looking policies and initiatives. Since the opening of the space sector to private players, the number of startups in this domain has surged, reflecting India's growing role as a global space technology hub. "Israeli space startups have immense potential to collaborate with their Indian counterparts," he noted, underlining the mutual benefits of leveraging Israel's innovation prowess with India's cost-effective production capabilities and large talent pool.

Highlighting the role of PPP+PPP—Public-Private Partnership plus Proactive Policy Push—Dr. Jitendra Singh described it as a unique model that has driven innovation and economic growth in India. He suggested that India and Israel adopt this framework to scale joint ventures in critical and emerging technologies. The Minister expressed confidence that combining India's economies of scale in terms of markets and manpower with Israel's economies of scale in innovation would create a winning formula for success.

The Minister spoke about Anusandhan National Research Mission (NRM), which aims to integrate and bolster research across disciplines in India. He linked this with Israel's capabilities in advanced research and development, envisioning a collaborative approach to solving global challenges. Dr. Jitendra Singh also touched on the expanding bio-economy sector, noting that the number of bio-startups in India has seen exponential growth under the present regime. He welcomed Israeli expertise in biotechnology, proposing partnerships that could drive innovation in agriculture, healthcare, and sustainable development.

During the meeting, the two ministers also explored partnerships in semiconductors, artificial intelligence (AI), and Internet of Things (IoT). Dr. Jitendra Singh encouraged Israeli companies to view India as a reliable partner in these critical domains, highlighting India's strides in indigenous tech development, including mobile manufacturing and 5G rollout.

Barkat expressed profound gratitude to India for its unwavering support, highlighting Prime Minister Narendra Modi's prompt solidarity during critical moments. He elaborated on Israel's innovative economic model, which identifies six key clusters driving exports. These include advanced manufacturing, life sciences, and high-tech sectors. The approach involves aligning infrastructure to these clusters, creating specialized facilities like labs that cater to multiple startups. For instance, shared laboratories for agri-tech companies not only reduce costs but also foster a collaborative ecosystem. By leveraging public-private partnerships, Israel maximizes efficiency and scales innovations effectively, offering a replicable framework for India-Israel collaboration.

Mr. Barkat emphasized the potential for deeper India-Israel ties through strategic pilot projects and infrastructure investments tailored to sector-specific needs. He pointed out that Israel's small yet innovation-rich economy complements India's vast scale in market size and talent. Collaborative pilots, particularly in areas like artificial intelligence and quantum technologies, could help create scalable solutions for both nations. By nurturing these collaborations, Israel and India can position themselves as global leaders in innovation while fostering stronger government-to-government and people-to-people relationships.

Both the Ministers agreed to initiate collaborative efforts in the agriculture and marine sectors, recognizing their potential for mutual benefit. They proposed the formation of a dedicated working

group to conduct an in-depth study of these areas, identifying opportunities for innovation and sustainable growth.

Dr. Jitendra Singh concluded by underscoring the shared aspirations of India and Israel as knowledge-based economies. He reiterated that partnerships in space, quantum computing, biotechnology, and other critical sectors would not only strengthen bilateral ties but also position both nations as leaders in global innovation. "Together, we can harness our strengths to address the challenges of today and create solutions for a better tomorrow," he remarked.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2080120>

THE ECONOMIC TIMES

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India nearing self-reliance in strategic navigation with NavIC: In-SPACE chief

In-SPACE Chairman Pawan Goenka said on Tuesday that India is almost self-reliant in data required for strategic applications, thanks to NavIC, the country's satellite navigation system similar to GPS. For civilian uses, too, where the stakes are not as high as in strategic applications, Goenka stressed the importance of avoiding dependency on foreign systems that could leave India vulnerable.

"Our goal with NavIC is to ensure that for all strategic needs -- whether in defence, civilian use or industry -- we are not reliant on others. If someone cuts off supply, we should have the capability to switch to our own systems," he said at a panel discussion during the GeoSmart India 2024 conference in Hyderabad.

However, NavIC would coexist with other navigation systems like GPS, he added while stressing that India should be able to meet its needs independently using NavIC.

NavIC (Navigation with Indian constellation) is India's own satellite navigation system developed by ISRO. It helps provide accurate location and time information, similar to GPS (global positioning system). It is designed to cover India and a region of up to 1,500 kilometres around it. Regarding communication satellites, Goenka said while India has a growing number of its own satellites, the country still relies partly on foreign satellites.

"Today, we may have slightly more Indian communication satellites than foreign ones, thanks to NSIL (ISRO's commercial arm NewSpace India Limited). But we need a steady supply of Indian satellites," he said.

Srikant Sastri, the chairman of the Geospatial Data Promotion and Development Committee (GDPDC), said there was a need for India to control critical technologies in certain sectors.

He said GDPDC has identified six key areas, including civil aviation and mapping, as strategic and critical. Centres of excellence set up by GDPDC will likely start work on these priorities next year, Sastri added.

<https://economictimes.indiatimes.com/news/science/india-nearing-self-reliance-in-strategic-navigation-with-navic-in-space-chief/articleshow/115934111.cms>

25-hour countdown begins for ISRO's commercial mission for European Space Agency

'Probas' is a Latin word, which refers to 'Let's try'. The mission objective is to demonstrate precise formation flying and the two spacecraft - 'Coronagraph' and 'Occulter' would be launched together in a stacked configuration, ISRO said.

The Bengaluru-headquartered ISRO is using its dedicated workhorse Polar Satellite Launch Vehicle (PSLV) for the mission. The PSLV is on its 61st flight and the 26th of the PSLV-XL variant and it is scheduled for a lift-off from the first launch pad at this spaceport at 4.08 pm on December 4.

The 44.5 metre tall rocket after travelling for about 18 minutes is slated to place the 550kg Proba-3 satellites into a desired orbit. After reaching the initial orbital conditions, the two satellites would fly 150 metres apart (as one large satellite structure) in tandem so that the 'Occulter' spacecraft would block out the solar disk of the sun enabling Coronagraph to study the corona of the Sun or the surrounding atmosphere, for scientific observation.

"The corona-much hotter than the Sun itself, is where space weather originates and a topic of widespread scientific and practical interest," the ESA said. The significant objective of the mission is formation flying in precision and to study the Sun's outer atmosphere.

This pattern of (blocking the solar disk of the sun) formation occurs during solar eclipses and that too for a few minutes for scientists to study. However, the European Space Agency said with Proba-3, the mission would be able to create 'solar eclipses on demand.

"The two satellites would fly together as a 'large rigid structure' in space to prove formation flying technologies and rendezvous experiments, the ESA said.

"The mission will demonstrate formation flying in the context of a large-scale science experiment. The two satellites will together form an approximately 150-metre long solar coronagraph to study the Sun's faint corona closer to the solar rim than ever before it has been achieved," it said.

ISRO would be facilitating the launch while European Space Agency scientists would take up study on the mission, post it reaching the desired orbital conditions. For ISRO, this launch would provide key insights on taking up scientific experiments on the Sun after its maiden mission-- Aditya-L1 which was successfully launched in September 2023.

After lifting-off at the scheduled time of 4.08 pm on Wednesday, the satellites are expected to reach high earth orbit and would have a 19.7 hour orbital period with 60,530 km of apogee (farthest point from earth) and 600 km perigee (closest point to earth). ISRO has used the PSLV-XL variant to carry heavy payloads of about 500 kg in the ambitious Chandrayaan, Mars Orbiter Missions.

The Coronagraph spacecraft in Proba-3 weighs about 310 kg while the Occulter spacecraft is 240 kg. The Proba-3 mission follows the earth observation satellite Proba-1 launched by ISRO in 2001 and Proba-2 in 2009.

The European Space Agency had also launched the Proba-V mission in 2013. Europe has made significant progress in multi-satellite missions in the past including the 'Automated Transfer

Vehicle' mission which demonstrated precision down to a few centimetres when docking with the International Space Station. Sweden's Prisma Mission also demonstrated formation flying for brief periods, maintaining centimetre level accuracy across tens of metres, the ESA said.

<https://economictimes.indiatimes.com/news/science/25-hour-countdown-begins-for-isros-commercial-mission-for-european-space-agency/articleshow/115941684.cms>



Wed, 04 Dec 2024

Three papers in Nature have reported how extrachromosomal DNA contributes to the progression of cancer and drug resistance; the findings also challenge a law of genetics

In normal human cells, the nucleus contains 23 pairs of chromosomes that enclose the DNA.

Once brushed aside as a curiosity, extrachromosomal DNA (ecDNA) is now taking centre stage in the complex field of cancer biology. Scientists first discovered it as a small fragment of genetic material in cancer cells 50 years ago. Because it was present in only 1.4% of tumours, they didn't consider it to be important.

But more sophisticated genomic techniques later revealed their mistake: one study published in 2017 revealed ecDNA is present in nearly 40% of cancer cell lines and in up to 90% of patient-derived brain tumour samples, revealing its pivotal role in cancer biology.

On November 6, three papers were published in the journal *Nature* by a team called eDyNAmiC — an international collaboration led by Stanford University professor Paul Mischel. The studies explore how ecDNA is formed and contributes to the progression of cancer and drug resistance.

Importantly, the findings also challenge a fundamental law of genetics.

What is ecDNA?

In normal human cells, the nucleus contains 23 pairs of chromosomes that enclose the DNA. There are some natural processes that can damage DNA. For example, in chromothripsis, which occurs in some cancers, the chromosomes are broken and rearranged. Cells can also make mistakes in the DNA when making copies of it to imbue in new cells. Such processes could cause a small part of the DNA to break away from the main chromosome and form a circular structure that floats freely inside the nucleus. This is ecDNA.

One of the three studies was led by eDyNAmiC members Mariam Jamal-Hanjani and Charles Swanton, both professors at University College London. They analysed the mutation patterns in tumours before and after the formation of ecDNA. They identified various environmental factors, including smoking, exposure to certain substances, and genetic mutations, to be triggers of DNA damage that could lead to the formation of ecDNA.

In the same study, the researchers attempted a comprehensive analysis of samples from nearly 15,000 cancer patients from U.K.'s 100,000 Genomes Project, covering 39 tumour types. They validated their findings using a method called fluorescence in-situ hybridisation (or FISH), which specifically looks for certain cancer-related genes in tissue samples.

They found that ecDNA was present in about 17% of tumour samples but more so in liposarcomas, brain tumours, and breast cancers. They also reported that the prevalence of ecDNA rose after treatments like chemotherapy, and correlated with metastasis and worse patient outcomes.

ecDNA and cancer growth

ecDNA present in tumours often contain multiple copies of oncogenes — mutated genes capable of causing cancer — that are required to activate tumour growth. But these oncogenes are not present in chromosomes, where scientists used to believe they lived.

In a study published in 2021 led by another Stanford University professor, Howard Chang, showed that while chromosomal DNA is fixed within specific regions in the cell, ecDNA moves freely and can interact with other ecDNA to form hubs — concentrated zones where oncogenes are expressed more.

Cells transcribe DNA to mRNA to use the latter to manufacture proteins. The 2021 study also found that when cells transcribe ecDNA to mRNA, the process causes specific oncogenes to become four-times more common in the cell than if the DNA came from the chromosomes.

This anomaly has the potential to accelerate the evolution of tumours and help the cancer resist drugs.

An inheritance of loss

Another finding reported in the new studies involves a fundamental shift in scientists' understanding of genetics.

Typically, when cells divide, they duplicate the chromosomes and distribute it equally among their daughter cells. In this process, researchers have known the genes on the same chromosome are inherited together while those on different chromosomes are distributed independently of one another. This basic genetic principle is called Mendel's third law of independent assortment (named after Gregor Mendel).

But in the second of the three studies, a team led by Mischel and Chang used single-cell sequencing, imaging, and modelling to report that ecDNA is passed on in clusters to the daughter cells during cell division — a violation of the third law. This clustering gives some cancer cells an advantage because it allows them to enhance gene interactions, support cancer growth, and preserve favourable genetic combinations over multiple life-cycles. The researchers have called this the “jackpot effect”.

This discovery has profound implications. It overturns the idea that gene inheritance is entirely random when the genes are not linked by DNA strands. The researchers also reported that the transcription process — from DNA to RNA — facilitates the coordinated segregation of ecDNA during cell division.

A new vulnerability in cancer cells

But for the new threats posed by ecDNA, the third study uncovered a potential weakness in tumours that relies on ecDNA. The unusual structure of the ecDNA and its interactions with other DNA elements increases the activity of specific genes. This can lead to a conflict between the cellular machinery involved in making RNA and the activity of cancer cells that leads to DNA damage.

Cells respond to this conflict by the heavy use of a protein called CHK1, which helps fix DNA and allows the cell to keep growing. When the researchers used a drug called BBI-2779 that blocks

CHK1, they found the drug selectively killed cancer cells with ecDNA, significantly reducing the number of tumours in mice with stomach cancer.

A San Diego-based biotechnology company co-founded by Mischel and Chang, called Boundless Bio, is currently working to translate these discoveries for clinical use. The company's stated aim is to give patients new treatment options that target vulnerabilities created by ecDNA. This is particularly crucial for patients with ecDNA-driven cancers, such as glioblastoma and ovarian and lung cancers, where current treatments often fall short.

<https://www.thehindu.com/sci-tech/science/extrachromosomal-dna-challenges-law-of-genetics-groundbreaking-studies/article68941909.ece>



Tue, 03 Dec 2024

ISRO's Shukrayaan mission to carry synthetic aperture radar

ISRO is dispatching a synthetic aperture radar (SAR) payload to map the surface of Venus. The instrument will be able to peer through the thick atmosphere of Venus that obscures the surface, and will be able to measure the slightest changes and deformations on the surface. The instrument is exquisitely sensitive, and will be able to provide a comprehensive, high-resolution map of the hidden Venusian surface.

The only previous spacecraft to execute a similar mission was NASA's Magellan, that plunged into the atmosphere of Venus in the summer of 1993. The data gathered by the instrument is expected to provide valuable insights to scientists on Earth's 'sister planet'. ISRO is loading a similar payload on the NISAR partnership with NASA, to monitor the surface of the Earth.

The primary objectives of the Shukrayaan mission to Venus is to study the thick atmosphere of the planet and its hidden surface topography. To execute both of these tasks, ISRO is planning to use the atmosphere of Venus itself. An atmospheric probe will plunge through the atmosphere, capturing as much data as possible on the way, and may even make it to the surface intact. The thick atmosphere of Venus will also be used by the orbiter, to shed its velocity.

ISRO hopes to unravel the complex atmospheric chemistry of Venus with the Shukrayaan mission, as well as the photochemical influence of solar radiation on the atmosphere, which will in turn help scientists better interpret the observations of distant terrestrial exoplanets, and possibly aid in the decades-long search for extraterrestrial life as well. The Union Cabinet formally approved the Shukrayaan mission in November. ISRO is smartly using local atmospheric conditions in its interplanetary missions.

Speaking at Chandra Public Lecture at IUCAA in Pune last month, ISRO scientist Nigar Shaji said, "The Venus Orbiter Mission was recently approved and here we wanted to mainly focus on the Venus atmospheric studies and the surface topography. After Magellan, this is going for mapping. Up to a 40 cm resolution we can map it. We have a synthetic aperture radar which can map surface and subsurface, and also the Sun-Venus atmosphere interaction. So these are all the major objectives. Here we wanted to employ aerobraking. We use the Venus atmosphere to brake it so that we can go to a smaller orbit. If we don't use the aerobraking, we have to spend some 1000 kg of fuel to do the same. Here what we do is, the spacecraft we plunge into the atmosphere, so

atmosphere reduces the velocity. So when it comes out, the apogee will reduce, the orbit will come down.” ISRO will also be using the atmosphere of Mars to shed the velocity on the Mangalyaan 2 mission.

<https://www.news9live.com/science/isros-shukrayaan-mission-to-carry-synthetic-aperture-radar-2765078>



Tue, 03 Dec 2024

ISRO is developing its own Sky Crane to land on Mars

On 24 September, 2014, ISRO's Mars Orbiter Mission or Mangalyaan successfully entered into orbit around the Red Planet. India became the fourth country in the world to inject a spacecraft into Martian orbit, and the only country to do it on the first attempt. Now, ISRO has advanced its capabilities by demonstrating soft landing on an extraterrestrial surface with the Chandrayaan 3 mission, and is returning to Mars with its Mars Lander Mission, dubbed Mangalyaan 2. While the Earth has a dense atmosphere, the Moon has an insubstantial atmosphere, and only requires retrothrusters to land and take off from the planet. Mars however has a thin atmosphere, and ISRO plans to use it to the fullest for the soft landing.

The atmosphere of Mars is only one percent as dense as the Earth's, and is primarily composed of carbon dioxide. The challenge for ISRO is to rapidly shed the velocity of the spacecraft as it travels through this tenuous atmosphere of Mars. The spacecraft has to be protected from the heat generated by the extreme friction of striking the atmosphere, and then rapidly decelerate through the atmosphere of Mars before executing a soft landing on the surface.

Mangalyaan 2 will be travelling at an incredible velocity of seven kilometres per second, fast enough to make the trip between Jaipur and Delhi in 40 seconds when it strikes the atmosphere of Mars. There are approximately seven minutes available for executing a complex series of perfectly timed operations to reach the surface safely.

Seven Minutes of Terror

ISRO is borrowing a trick from NASA for the soft landing. A heat shield will protect Mangalyaan 2 during the atmospheric entry, and will then be shed. A supersonic parachute will then use the tenuous atmosphere of Mars to decelerate the spacecraft. At an altitude of about 1.5 kilometres, ISRO plans to use a sky crane, an element with retrothrusters that stabilises the lander, lowers it gently to the surface, then flies away.

The hardware is being developed specifically for the conditions on Mars. For example, the area of the supersonic parachutes are much more than what would be used on Earth, to compensate for the fact that Mars has a much thinner atmosphere. ISRO is also planning to develop a Mars helicopter, and the rotors would have to spin faster than a similar drone on Earth.

At the Chandra Public Lecture at IUCAA, Pune, last month ISRO aerospace engineer Nigar Shaji said, “We wanted to make use of the atmosphere, and we will have supersonic parachutes which will be deployed. The area we wanted to increase so that we can decrease the speed. We wanted to have the crane type landing system. Like a crane, it will lower the rover so that you can place it on the Mars surface.”

While Earth is brimming with life, the other terrestrial worlds in the Solar System, Venus and Mars are inhospitable to life. In the future, Earth may become like either one of these planets, which is why ISRO is planning planetary exploration missions to Venus and Mars.

<https://www.news9live.com/science/isro-is-developing-its-own-sky-crane-to-land-on-mars-2764980>

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