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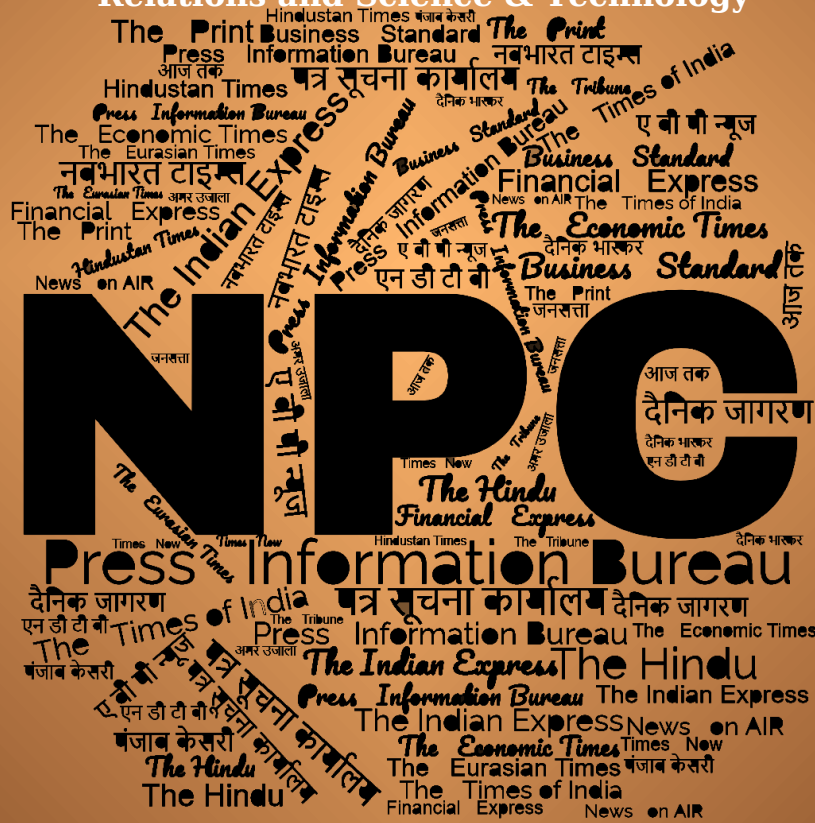
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The Tribune

Thu, 18 May 2023

DRDO Roots for Solar-Powered Greenhouses in Ladakh after Experiments Show Warm Season Crops can be Grown in Harsh Winters

The Defence Research and Development Organisation (DRDO) has rooted for solar-powered greenhouses in Ladakh region, which faces extreme climatic conditions, after experiments proved that a variety of warm-season crops can be successfully grown during the winter period.

Scientists at Leh-based Defence Institute of High Altitude Research used an “active” polycarbonate greenhouse with heat convectors deriving energy from solar panel-powered batteries being used to maintain the requisite temperature.

Active greenhouses use supplementary energy from various available sources for the maintenance of essential temperature in cold climates and are different from passive greenhouses which are simply enclosed structures.

“As a result of temperature maintenance, the output in terms of yield for different crops like cauliflower, knol-khol, cabbage and broccoli was reported for the first time in any existing greenhouse of the region during winter periods,” a paper published recently by DRDO states.

“Temperature maintenance with simple and easily available technologies was found effective in the production of fresh vegetables during the winter period in the cold arid high-altitude conditions of Ladakh, which otherwise is not possible,” the study adds. The survival percentage of plants grown inside the greenhouse was reported to be 92.5 per cent to 100 per cent, though the time taken for cultivation was slightly longer than what it normally takes during the summer season. The Trans-Himalayan cold arid high-altitude region of Ladakh has hostile climatic conditions, with temperature falling as low as minus 45 degree Celsius. Production of fresh food locally is difficult due to low atmospheric temperatures. The region remains cut off from the rest of the country for months during winters because of roads being closed due to heavy snow.

This causes acute shortage of fresh food. Some supplies are brought in by air, but this is expensive and available only to a limited population. The local populace has to survive on red meat or packaged food that contains preservatives and chemicals which can cause diseases. In addition, the unavailability of fresh food leads to nutritional deficiency, the study observes.

In harsh winters, heating needs to be supplemented to protect plants and make production of crops in greenhouses possible. Pointing out that vegetable production in greenhouses at present is almost negligible, particularly during the winter period, the study has suggested that one of the possible solutions is use of active greenhouses powered by non-conventional or renewable energy.

<https://www.tribuneindia.com/news/nation/drdo-roots-for-solar-powered-greenhouses-in-ladakh-after-experiments-show-warm-season-crops-can-be-grown-in-harsh-winters-508956>

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Fri, 19 May 2023

Defence Production Crosses Rs 1 lakh Crore Mark for the First Time Ever

**Stands at almost Rs 1.07 lakh crore in Financial Year 2022-23, an increase of more than 12%
over 2021-22**

As a result of the consistent efforts of Ministry of Defence, the value of defence production in Financial Year (FY) 2022-23 has crossed the figure of Rs one lakh crore for the first time ever. The value currently stands Rs 1,06,800 crore and it will go further up once the data is received from the remaining private defence industries. The current value of defence production in FY 2022-23 is a rise of more than 12 per cent over FY 2021-22, when the figure was Rs 95,000 crore.

The Government is continuously working with defence industries and their associations to remove the challenges faced by them and promote defence production in the country. A number of policy reforms have been taken to achieve the objective of ease of doing business, including the integration of MSMEs and start-ups into the supply chain.

Due to these policies, the industries, including MSMEs and start-ups, are forthcoming in defence design, development and manufacturing and there is almost a 200 per cent increase in the number of defence licenses issued to the industries in the last 7-8 years by the Government. These measures have given a boost to the defence industrial manufacturing ecosystem in the country and generated tremendous employment opportunities.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1925369>



Press Information Bureau
Government of India

Ministry of Defence

Fri, 19 May 2023

First Sea Sortie of Sixth Scorpene Submarine ‘Vaghsheer’

The sixth submarine of Project 75, Yard 11880, Indian Navy’s Kalvari class commenced her sea trials on 18 May 23. The submarine was launched in 20 Apr 22 from the Kanhoji Angre Wet Basin of Mazagon Dock Shipbuilders Limited (MDL). Vaghsheer is scheduled for Delivery to the Indian Navy in early 2024 after completion of these trial.

MDL has 'Delivered' three submarines of the Project – 75 in 24 months and the commencement of sea trials of the sixth submarine is a significant milestone. This is indicative of the boost towards AatmaNirbharBharat.

The submarine will now undergo intense trials of all its systems at sea, these include propulsion systems, weapons and sensors.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1925363>

Naval Technology

Thu, 18 May 2023

Lanza-N Radars Delivered to Augment Indian Navy Vessels

Indra has installed the first of the 23 Lanza-N radars that will equip Indian Navy ships over the next decade.

The Madrid-based tech company are the original equipment manufacturer of the 3D radar system. The Lanza radars will replace the ELM-2248 MF-STAR and RAWL-02/LW-08 radars on India's destroyers: Kolkata-class and Visakhapatnam-class, according to GlobalData Defence analyst Tushar Mangure.

Indra and the Hyderabad defence company, TATA Advanced Systems, signed a deal in 2020 as part of a technology transfer programme.

Indra has adapted the Lanza-N radar – based on the one installed in the Spanish ship Juan Carlos I – to the regulatory requirements of India. The modifications suit Indian Ocean conditions, guaranteeing optimum performance in high humidity and extreme heat conditions.

The Lanza family are multi-scenario, multi-threat adaptive radars. The radar design operates according to Nato's technical requirements and it anticipates the changing threat scenario of the future.

The Lanza-N integrates a 3D primary surveillance radar that provides medium and long range coverage up to 254 nautical miles. The radar detects aircrafts, even under adverse conditions, including clutter. Target co-ordinates provided by the surveillance radar include target altitude (3D position).

India's plans for Lanza-N

GlobalData intelligence tells us that the Indian Navy plans to integrate the radar more widely.

"The Lanza-N radar system may also be deployed onboard the Nilgiri-class frigates, which are already in advanced stages of construction.

"There is a strong possibility that these radars will also be installed on the Navy's future Project-18 Next-Generation Destroyer. Moreover, the acquisition of the new radar is also in line with the navy's Maritime Capability Perspective Plan (MCPP), which places a priority on expanding the capabilities of naval platforms in addition to increasing fleet size numerically," Mangure adds.

Currently, the Indian Ministry of Defence claims its present force level comprises 150 ships and submarines. India's perspective-planning moves from the number of platforms to one that concentrates upon its capabilities.

This is a common naval strategy in the current security climate. Navies are producing less costly vessels more quickly – such as the Indian navy's Niligiri-class frigates, the US Navy's littoral

combat ships, or the increased operations of the UK Royal Navy's patrol vessels HMS Spey and HMS Tamar in the Indo-Pacific.

<https://www.naval-technology.com/news/lanza-n-radars-delivered-to-augment-indian-navy-vessels/>



Fri, 19 May 2023

India, US to Herald New Era of Defence Cooperation

Ahead of Prime Minister Narendra Modi's official state visit to the USA, officials of both countries have intensified their discussions on co-producing jet engines, long-range artillery and infantry vehicles under the Initiative on Critical and Emerging Technologies (iCET). India's National Security Advisor Ajit Doval and US NSA Jake Sullivan launched iCET earlier this year.

It was done at the direction of US President Joe Biden and Indian Prime Minister Narendra Modi who after their Tokyo meeting in May 2022 had announced to elevate and expand the strategic technology partnership and defence industrial cooperation between the governments, businesses and academic institutions of the two countries.

At a meeting with Indian Defence Secretary Giridhar Aramane at the Pentagon, US Deputy Defense Secretary Kathleen Hicks termed the proposals to co-produce jet engines, long-range artillery and infantry vehicles under iCET "unprecedented opportunities" to strengthen ties between the defence sectors of the two nations.

The two officials discussed priorities for strengthening the US-India defence partnership, including increasing defence industrial cooperation and operational collaboration, Pentagon spokesperson Eric Pahon said. Hicks underscored the importance of the US-India relationship as critical for promoting peace and prosperity in the Indo-Pacific and beyond. She also reiterated the importance of deepening military-to-military relations between the two nations as the technology partnership grows, Pahon added.

Reiterating the US's support for India's defence modernisation objectives, including increasing investments in Indian domestic manufacturing, Hicks and Aramane welcomed the upcoming launch of INDUS-X ahead of PM Modi's visit to the United States in June. They also highlighted its value as an opportunity to promote partnerships between the two countries' defence innovation ecosystems.

A day earlier, the two officials co-chaired the 17th US-India Defense Policy Group meeting. The dialogue advanced an ambitious agenda -- including industrial cooperation, information-sharing, maritime security, and technological collaboration -- that reflects the robust and comprehensive defence ties between the United States and India, said US Department of Defense spokesperson Lt Col David Herndon.

"The officials exchanged views about shared priorities in the Indian Ocean Region and aligning the US-India partnership with other like-minded partnerships to sustain a free and open Indo-Pacific. "The leaders reinforced their commitment to strengthening cooperation and interoperability between the US and Indian militaries to work together in all domains and across all services," the spokesperson added.

<https://zeenews.india.com/india/india-us-to-herald-new-era-of-defence-cooperation-2610088.html>

Thu, 18 May 2023

Transformation of Indian Army in Digital Domain

By Maj Gen Ashok Kumar, VSM (Retd)

Geo-political situation is changing fast in the world. These changes are heralding a new era of challenges and opportunities at the same time for India. Russia- Ukraine war has affected India already on three counts to include lack of requisite support for the defence equipment of Russian origin, 'No limit' friendship between Russia & China and above all a special challenge to balance its relationship both with USA and Russia who are opposing each other tooth and nail.

In addition to the above, the conflict scenario is growing in the Indo- Pacific besides China continuing its transgression across Line of Actual Line control (LAC) for more than three years now with major transgressions yet to be resolved in Depsang plains and Demchok. India has speeded its border infrastructure, focussed on indigenisation of the defence equipment and embarked on capability development programmes at the national level.

As far as the Defence Services are concerned, a lot of work is under progress for the theaterisation of the defence forces for enhancing their effectiveness as well as optimisation of stand alone approach based expenditures. While all these things are progressing, each Service is attempting to make itself more potent. The Indian Army is no exception. It has launched a silent technological revolution having declared the Year 2023 as the 'Year of Transformation'.

Though the 'Year of Transformation' has large No of issues and steady progress is being made on multiple counts, the most startling revelation has been the automation and netcentric approach in warfighting which has been the 'work in progress' for quite some time but has attained the crucial fructification in the recent past. The year 2023 will be able to transform the Indian Army given the current focus of the Directorate General of Information Systems (DGIS).

No of articles have appeared on the said subject where each has covered certain aspects of this technological transformation. An attempt will be made in this article to highlight the operational need and effectiveness of these automation projects.

The first and foremost requirement of any Army is to have effective Surveillance across the borders not covering only the area of influence but also the area of interest. Both these areas are expanding with increasing range of sensors and growing ranges of the long range vectors. The surveillance requires use of multiple sensors as each type of sensor has its own advantages as well as limitations. The variety of sensors operating from various platforms ranging from underwater locations and extending upto the space do provide large No of inputs but the challenge lies in synthesising this information and making it available in the readable format for military commanders to discern and take timely decisions. This need is being met through Battlefield Surveillance System (BSS) known as Project SANJAY (name probably takes its origin from Mahabharat wherein SANJAY was able to see all the happenings of the battlefield despite not being present their physically and was narrating the events of Mahabharat sitting far away from the battlefield. BSS also intended to operate through large No of surveillance centres spread across all along our borders so that sensor information can be fused in the realistic time frame. Though it is not known, there is a high probability of this project leveraging Artificial Intelligence (AI) and Machine Learning (ML) as well in the due course.

Having focussed on surveillance, Indian Army has also focussed on effective employment of long range vectors wherein it has operationalised the Artillery Combat Command and Control System (ACCCS) for effective control of these resources. It will be in fitness of things if the organisational changes are also undertaken and complete rocket & missile forces are also brought under this. This system also known as Project Shakti unleashes accurate fire power on the adversary.

Whether they be the surveillance devices/sensors or the trajectories of the fired warhead, they are susceptible to weather conditions that too in a complex manner. Weather affects Surveillance sensors based on the technology being used by the concerned sensor whereas warhead trajectories traverse through varying layers of weather conditions and therefore only an accurate factoring of this facet can ensure the desired accuracy. Indian Army is seized with this need and operationalising its project ANUMAN to ensure that the accurate weather data is available to all the stakeholders. These are not limited only to Sensors and shooters but a large number of other stakeholders who have to plan their movement in glaciated/adverse terrain besides being of great utility to plan and sustain operations both during war and peace.

The data of sensors and shooters need to be synchronised on a common map system for which a common GIS platform is being developed for all the stakeholders as part of Project AVGAT. The best part is that this is being done in the sync of national effort for Project GATISHAKTI which is harnessing the data from close to 16 ministries. This approach is the best national effort and needs to transcend to all other domains as well.

But all this will be of limited impact if the decision makers are not adequately empowered. The Army has automated the E- Sitreps for providing the information with enhanced readability for which Situational Awareness Modules for the Army (SAMA) has been developed. This will be an important link to the decision support system which itself is being comprehensively automated. Once they are fully operational, it will change the way we fight. Clearly, we shall be able to deliver much more from the existing resources.

Network for Spectrum (NFS) project has provided reasonable bandwidth to the defence forces including Indian Army (IA) which are being utilised for fast processing of data, creation of data centres for multiple purposes & build redundancies. The concept of edge computing will further facilitate the warfighting in a more effective manner. All this will lead to a clear cut battle supremacy against our adversaries, be it China or Pakistan. All other automation projects will be able to utilise this medium for fast and real time processing of the data.

IA has not utilised this year of transformation only for the operational purposes but has expanded the concept to the multiple domains. IA has focussed on operational logistics as well wherein Computerised Inventory Control Project (CICP) is executing automation of Ordnance resource on ERP solutions model. It has the potential to incorporate all other logistics requirements both for war and peace. A consolidated approach will be definitely rewarding.

IA has also focussed on the efficient management of its large Human Resources (HR) through ARPAN which provides the inputs for Indian Army Data Repository and Analytics (INDRA). This technological empowerment is also aiding the decision makers at all levels.

These are not the only initiatives by IA to enter into the domain of Net Centric warfare but all other fields whether linked directly or indirectly are also being automated in a time bound manner. The physical paper from the office is vanishing fast by adoption of the E-office, another effort to leverage the national effort. The E-Office has already been adopted by the Central Government.

The focus has not been only on the current force structure constituents but also on recently introduced AGNIVEERS for whom Project ASAAN (Army Software for Agnipath Administration and Networking) has been operationalised. IA is touching almost every facet of its automation to make it more capable. As and when we have own operating system (OS) of international standards,

infuse modern technological tools, automate after the Business Process Review (BPR) as against automating the current way of doing things, make all automation projects agnostic to OS as well as other linkages and make these scalable & synergistic to all the three services as well as national Stakeholders, the country would be really transformed even if all the aims are not fully achieved in the Year 2023.

<https://www.financialexpress.com/business/defence/transformation-of-indian-army-in-digital-domain/3092610/>

THE TIMES OF INDIA

Fri, 19 May 2023

Quad Summit Off, but it's All Systems Go for Malabar Drill

The Quad summit may now take place in Hiroshima instead of Sydney but it's all systems go for the top-notch Malabar naval exercise among India, the US, Australia and Japan off the Australian coast in August, with the aim to further boost military interoperability and deter any coercion in the crucial Indo-Pacific region by China.

Ahead of the Malabar exercise, which will be hosted by Australia for the first time from August 11 to 21, chief of defence staff General Anil Chauhan put forth India's views on "deterrence through effective partnerships" at the Indo-Pacific security dialogue with top Quad military leaders earlier this week in California.

The Indo-Pacific also figured high on the agenda during the 17th meeting of the India-US Defence Policy Group meeting in Washington on Wednesday, which was co-chaired by defence secretary Giridhar Aramane and American under-secretary of defence for policy Dr Colin Kahl.

"The officials exchanged views about shared priorities in the Indian Ocean Region (IOR) and aligning the US-India partnership with other like-minded partnerships to sustain a free and open Indo-Pacific," the Pentagon said.

Measures to deepen the bilateral "major defence partnership" as well industrial and technological cooperation, information-sharing and maritime security, military-to-military cooperation and combat exercises, were also discussed in the dialogue.

The intensive Malabar wargames, of course, provide the most visible and potent military dimension to the Quad, though India maintains the grouping is not a military bloc or alliance.

India will be dispatching a Kolkata-class guided missile destroyer, a Shivalik-class multi-mission stealth frigate and P-8I long-range maritime patrol aircraft for the Malabar combat manoeuvres in August, as was earlier reported by TOI.

The Malabar began as a bilateral endeavour between India and US in the 1990s and then formally included Japan as a regular participant in 2015 and finally Australia in 2020 to complete the Quad.

India has inked reciprocal military logistics agreements, which provide for refuelling and berthing facilities for each other's warships and aircraft, with the other three Quad countries. While India has forged an expansive defence cooperation with the US over the last two decades, it is now also steadily cranking up bilateral military ties with Japan and Australia.

India and Japan, for instance, are now extending their defence cooperation to the emerging space and cyber domains as well. In January, India had deployed four Sukhoi-30MKI fighters supported by two C-17 Globemaster-III strategic lift aircraft, one IL-78 mid-air refueler and around 150 IAF

personnel for the first-ever air combat exercise with Japan called “Veer Guardian” at the Hyakuri air base. India and Japan already conduct the ‘Dharma Guardian’ exercise between their armies and the ‘JIMEX’ between their navies.

India and Australia have also shed their earlier inhibitions in the face of China continuing to make strategic inroads into the IOR with a navy that is already the world’s largest with 355 warships and submarines.

<https://timesofindia.indiatimes.com/india/quad-summit-off-but-its-all-systems-go-for-malabar-drill/articleshow/100341865.cms>

THE ECONOMIC TIMES

Fri, 19 May 2023

Quad Summit on G7 Sidelines; Agenda Intact

PM Narendra Modi will leave for Japan on Friday following an invite to participate in three outreach sessions at the G7 Hiroshima Summit and participate in the Quad Summit on the sidelines of the Summit during May 20-21.

Modi will be part of three outreach sessions — Working Together to Address Multiple Crises (including food, health, development, gender); Common Endeavour for a Sustainable Planet (including climate, energy, environment) and Towards a Peaceful, Stable and Prosperous World — key concerns for the Global South.

Addressing the media on the eve of Modi’s three-leg visit to Japan, Papua New Guinea and Australia, foreign secretary Vinay Kwatra said, “The Quad Summit will now take place in Hiroshima, Japan, as all four leaders will be there at the same place for the same conference”.

“There’s a change only in venue but not in the main agenda. Leaders will go ahead with the agenda decided for the meeting at Canberra,” said Kwatra.

“They will take good stock of the situation and build on that. A lot of preparation has gone on. We are expecting several deliverables to come out from this meeting,” he said.

On the eve of PMs departure Japanese envoy to India Hiroshi Suzuki told ET that his PM will seek to closely work with Modi to coordinate and unite approaches between G7 and G20 to address critical global issues including food security. While the G7 will speak unitedly against Russia following the Ukraine war, the Japanese PM will seek to unite divergences between G7 and other members of the G20, Suzuki pointed out.

India has been a consistent partner of G7 countries and is recognised as a partner democracy from the Global South, officials pointed out, adding that India can take this opportunity to bring issues of Global South to the fore. Partner countries at G7 Summit this year include Brazil and Indonesia, which together with India make the outgoing and incoming G20 troika countries.

India has attended nine G7 Summit outreach sessions till date: 2003 (France); 2005 (UK); 2006 (Russia); 2007 (Germany); 2008 (Japan); 2009 (Italy); 2019 (France); 2021 (UK); and Germany (2022). All participations from India have been at the level of Prime Minister.

While G7 continues to wield power and has a unique status in the global governance architecture, the G20 has acquired greater relevance by virtue of presence of countries such as China and India, who have a major contribution to the global economic output. In view of this, there has been talk of expansion of G7 into a G10 or a D10 (Democracies 10) for some years.

The G7 countries (Canada, France, Germany, Italy, Japan, UK and USA) held their first summit as the G6 in France in 1975 after the first oil crisis; Canada joined the following year. From 2010-2014, Russia was a member of the group and it was called the G8.

G7 leaders meet annually, with the annual presidency rotating among the countries. G7 is not a formal institution with a charter and a secretariat; the Presidency is responsible for setting the agenda of each year's Summit. The G7 members currently represent close to 45% of the global GDP and more than 10% of the world's population.

From its initial focus on economic issues, the G7 has gradually become a forum for consultation to find common ground on major global challenges, including peace and security, counter-terrorism, development, education, health, environment and climate change. Since 2003, non-member countries (traditionally developing countries of Asia and Africa) have been invited to the 'Outreach Session'.

The G7 has developed interactions with non-state stakeholders leading to the creation of several engagement groups on issues related to business, civil society, labour, science and academia, think-tanks, women's rights and youth. They give recommendations to the G7 Presidency.

In total, Japan has invited eight partner countries (including India), namely Australia, Brazil, Comoros, Cook Islands, Indonesia, Republic of Korea, & Vietnam and seven International Organisations (IOs) namely UN, IEA, IMF, OECD, WB, WHO, WTO.

<https://economictimes.indiatimes.com/news/defence/quad-summit-on-g7-sidelines-agenda-intact/articleshow/100341714.cms>



Fri, 19 May 2023

Navy Deploys Aircraft to Scan Ocean for Survivors after Chinese Vessel Sinks

The Indian Navy deployed its P-8I long-range maritime surveillance aircraft to the southern Indian Ocean to scan the remote waters for survivors after a Chinese fishing vessel with 39 people on board sank on Tuesday. The aircraft also dropped search and rescue (SAR) kits in the area at the request of the Chinese People's Liberation Army Navy (PLAN), Indian Navy officials aware of the matter said.

The Indian Navy also guided Chinese warships to the area where the vessel sank, the officials said.

The US-origin P-8I, inducted into the Indian Navy a decade ago, carried out sorties over the SAR zone on Wednesday and Thursday after the vessel, Lu Peng Yuan Yu 028, capsized in the stormy seas south of the Maldives, said one of the officials cited above, who asked not to be named.

The crew consisted of 17 people from China, 17 from Indonesia, and five from the Philippines. The Australian Maritime Safety Authority (AMSA) is coordinating the operation. SAR teams on Thursday recovered two bodies, media reports said.

"P-8I aircraft have carried out multiple and extensive searches despite adverse weather and located multiple objects possibly belonging to the sunken vessel. As an immediate response, search, and rescue equipment was deployed at the scene by the Indian aircraft on the request of PLAN warships in the area," said a second official, who also asked not to be named.

The P-8I aircraft flew from INS Rajali near Arakkonam in Tamil and carried out the search in an area almost 900 nautical miles away, the officials said. The navy has a fleet of 12 Boeing-made P-8I planes, split into two squadrons operating from Arakkonam and Goa.

The aircraft were bought from the US for more than \$ 3 billion to sharpen the navy's anti-submarine and anti-surface warfare capabilities. The P-8I is a military derivative of Boeing's 737-800 commercial aircraft.

"In a display of India's obligations as a credible and responsible partner for ensuring safety at sea, the Indian Navy units also coordinated SAR efforts with other units in the area and guided PLAN warships to the scene of [the] incident," said the second official.

The navy remains deployed to provide all possible assistance to the ongoing SAR efforts, the officials added.

Maritime affairs expert Commodore Srikant Kesnur (retd) said notwithstanding any jousting that is perceived to exist between India and China in the Indo-Pacific region, this response by the Indian Navy clearly illustrates that when it comes to crisis situations at sea, the humanitarian aspect is foremost as befits a highly professional maritime force.

The development comes at a time when India and China are locked in a long drawn-out border row in eastern Ladakh, and PLAN is taking steps to increase its footprint in the Indian Ocean region.

It also comes weeks after Chinese surveillance vessel Xiang Yang Hong 10 and at least eight maritime militia ships, a front for PLAN, sailed towards the area where the inaugural Asean-India naval drill was held in the South China Sea. Two Indian warships and a P-8I aircraft participated in the drill.

India is keeping tabs on China's moves in the South China Sea and taking steps to ensure that the Chinese navy does not muscle its way into the Indian Ocean where combat-ready Indian warships are carrying out round-the-clock surveillance for any unusual activity.

<https://www.hindustantimes.com/india-news/indian-navy-deploys-p-8i-aircraft-to-assist-in-search-and-rescue-of-chinese-fishing-vessel-in-southern-indian-ocean-101684476343492.html>



Thu, 18 May 2023

Australia Prioritises Quantum Technology for Defence

The Australian government intensified its efforts to accelerate the development of quantum technologies for defence application, highlighting these technologies as a key to improve the capabilities of the Australian Defence Force (ADF).

In a speech to the American Chamber of Commerce in Adelaide on 17 May, Australia's Deputy Prime Minister Richard Marles underlined the need to enhance advanced defence technologies such as 'quantum computing' with the help of allies including the US and the UK.

Marles said Australia will collaborate with the US and the UK under the AUKUS partnership to translate "advancements in technology [including in quantum technologies] into practical, asymmetric capabilities that can be distributed and deployed quickly" to deter future conflicts. In early May, the Australian Department of Industry, Science and Resources released the National

Quantum Strategy to guide national efforts towards developing quantum technologies for building advanced capabilities in crucial sectors including defence.

“[The National Quantum Strategy] has been drafted against a backdrop of accelerating geopolitical interest in quantum technologies, with the US, China, the UK, and the European Union all scaling up investment [in this domain] in the last two years,” Australia's Minister for Industry and Science Ed Husic said.

The strategy highlights five ‘central themes’ or areas of improvement for building a dynamic quantum ecosystem.

They include scaling up investment, and research and development (R&D) in quantum technologies; securing access to quantum infrastructure and materials; building a skilled workforce; ensuring that standards and frameworks support national interests; and building an ‘ethical’ quantum ecosystem.

<https://www.janes.com/defence-news/news-detail/australia-prioritises-quantum-technology-for-defence>

Science & Technology News

THE ECONOMIC TIMES

Thu, 18 May 2023

ISRO Getting Ready for Chandrayaan-3 Mission in July Second Week: Senior Official

If things go as planned, the Indian Space Research Organisation would launch its ambitious Chandrayaan-3 mission aimed at demonstrating critical technologies to land the spacecraft on the south pole of the moon in less than two months. Chandrayaan-3 mission carries scientific instruments to study the thermo-physical properties of the lunar regolith, lunar seismicity, lunar surface plasma environment and elemental composition in the vicinity of the landing site.

"Chandrayaan-3 mission is scheduled in July second week," a senior official of the Bengaluru-headquartered national space agency under the Department of Space told PTI on Thursday.

While the scope of these scientific instruments on the lander and the rover would fit in the theme of 'Science of the Moon', another experimental instrument would study the spectro-polarimetric signatures of the Earth from the lunar orbit, which would fit in the theme of 'Science from the Moon', according to ISRO officials.

In March this year, Chandrayaan-3 spacecraft successfully completed the essential tests that validated its capability to withstand the harsh vibration and acoustic environment that the spacecraft would face during its launch.

These tests were particularly challenging, considering the fact that the Chandrayaan-3 spacecraft, which would be launched by LVM3 (Launch Vehicle Mark-III) (earlier referred as GSLV Mk III) from SDSC SHAR, Sriharikota, is a composite of three modules -- propulsion, lander and rover.

"Chandrayaan-3 is a follow-on mission to Chandrayaan-2 to demonstrate end-to-end capability in safe landing and roving on the lunar surface. It consists of Lander and Rover configuration", an ISRO official said.

The propulsion module, which has Spectro-polarimetry of Habitable Planet Earth (SHAPE) payload to study the spectral and Polari metric measurements of Earth from the lunar orbit, would carry the lander and rover configuration till 100 km lunar orbit.

Lander payloads are: 'Chandra's Surface Thermophysical Experiment' to measure the thermal conductivity and temperature; 'Instrument for Lunar Seismic Activity' for measuring the seismicity around the landing site; and 'Langmuir Probe' to estimate the plasma density and its variations.

A passive Laser Retroreflector Array from the US space agency, National Aeronautics and Space Administration (NASA) is also accommodated for lunar laser ranging studies.

Rover payloads are: 'Alpha Particle X-ray Spectrometer' and 'Laser Induced Breakdown Spectroscopy' for deriving the elemental composition in the vicinity of the landing site.

The Lander would have the capability to soft land at a specified lunar site and deploy the Rover which would carry out in-situ chemical analysis of the lunar surface during the course of its mobility.

The main function of the propulsion module is to carry the lander module from launch vehicle injection till final lunar 100 km circular polar orbit and separate it. Apart from this, the propulsion module also has one scientific payload as a value addition which would be operated post separation of the lander module, it was noted.

<https://economictimes.indiatimes.com/news/science/isro-getting-ready-for-chandrayaan-3-mission-in-july-second-week-senior-official/articleshow/100333170.cms>

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Scientific Research Needs Sustained Investments

By Dinesh C. Sharma

HINGOLI is a town and a district headquarters in the Marathwada region of Maharashtra. It was a part of the territory under the Nizam of Hyderabad till 1948 and was used as a military base. The district is all set to acquire a new identity as the home to a global 'Big Science' project called Laser Interferometer Gravitational-Wave Observatory (LIGO). LIGO is a mega physics experiment designed to detect cosmic gravitational waves. Two such observatories are functional at Hanford and Livingston in the US, while two others are in Italy and Japan. Hingoli will be a part of this network once the observatory is ready by 2030. It will have an L-shaped interferometer with 4-km-long arms. The Prime Minister laid the foundation stone for the Rs 1,200-crore project via teleconference during the National Technology Day celebrations at Pragati Maidan in New Delhi last week.

While the scientific community is happy that a large research project is finally seeing the light of the day, the occasion provides an opportunity to examine our approach to such scientific projects, and fundamental research in general.

A consortium of Indian institutions started working on gravitational waves in 2009 and the idea of setting up an observatory in India was born then. The US-based LIGO laboratory formally asked Indian scientists to join its programme in 2011. Research work was initiated and the Indian group submitted a detailed proposal for an Indian LIGO to the Department of Atomic Energy and the

Department of Science and Technology the same year. The project was recommended for funding by a committee on mega science projects in 2012.

After facing red tape for four years, the project got 'in-principle' approval from the Union Cabinet in February 2016. It took another seven years for the Cabinet to give the final approval to a prestigious mega project backed by some of the finest Indian scientists. That speaks volumes about the so-called 'ease of doing science' approach.

The episode is a reflection of India's stagnating R&D expenditure, which has been a cause for concern for a long time. The Gross Domestic Expenditure on R&D (GERD) as a percentage of the GDP has hovered around 0.7 per cent for a decade now, according to a report published by the NITI Aayog last year. This is lower than even Brazil (1.16 per cent), South Africa (0.83 per cent), and, of course, much lower than China, which spends 2.14 per cent of its GDP on R&D. With such low contribution, the report said, R&D performance is bound to remain stagnant.

Policies set high goals but they are not backed by money and action. The Science Technology and Innovation (STI) Policy of 2013 envisaged positioning India among the top five global scientific powers by 2020. Nine years later, an updated STI Policy, 2022, came up with a reworded and vague goal — placing India among the top five countries in the world in terms of 'quality of research outcome' by 2030. Our policymakers fail to understand that no amount of rephrasing of goals can substitute the need for enhanced funding and focus on basic research.

In recent years, the success in Covid-19 vaccine development and manufacturing as well as the development of digital products such as CoWIN and UPI are being cited as proof of India's growing technological prowess, and rightly so. However, we ignore that these achievements are a result of sustained investments in research and the creation and nurturing of institutions over the decades.

Technical capabilities were built in state-funded national laboratories and higher education institutions and universities for several decades, and these have been utilised by the private sector. Take, for instance, vaccine development and manufacturing as well as the generic medicine business in the private sector. The labs under the Council of Scientific and Industrial Research (CSIR) and Indian Council of Medical Research (ICMR) developed capabilities to make drugs and vaccines, clinical trials, etc. since the 1970s, and helped the private sector grow.

Bodies like the Department of Biotechnology and the Technology Development Board handhold biotech firms like Bharat Biotech and Shantha Biotechnics in their formative years. Development funding worth hundreds of crores has flowed to private vaccine manufacturers. All these capabilities developed over the past three decades came in handy when the pandemic struck.

The same holds for achievements in the information and communications technology (ICT) sector. Research in computer science, mathematics and physics has paved the way for advancements in IT. Fundamental research in algorithms, artificial intelligence, cryptography and networking led to the development of computers, the Internet and smartphones.

India made early investments in computer science education at the Indian Institutes of Technology, Regional Engineering Colleges (known as National Institutes of Technology now), and later in the creation of the Indian Institutes of Information Technology. All these efforts not only helped the private sector IT industry take shape, but also helped in the development of new digital tools. Government institutions such as the National Informatics Centre, Centre for Railway Information Systems and National Payments Corporation of India have developed e-governance and other digital tools that are powering the digital revolution today.

No country can aspire to be a technological superpower without adequate and sustained funding and focus on fundamental research. Focusing on technological applications based on imported

hardware and knowledge is going to make India dependent on others. The investment in basic research also yields several spinoffs, industrial development and societal benefits. Some of the ubiquitous technologies like digital cameras, medical imaging and even the Internet are all spinoffs of basic research projects.

Basic research is playing a vital role in addressing complex global challenges — climate change, public health and food security. R&D in physics, chemistry, materials science and engineering is going to lead to the next breakthrough in renewable energy and sustainability. For the technologies of tomorrow, we need to invest in science today. The writing is on the wall.

<https://www.tribuneindia.com/news/comment/scientific-research-needs-sustained-investments-509058>

