



## CURRENT AFFAIRS



India's communication satellite GSAT-30 launched successfully

National Aerospace Laboratory wants govt. push for Saras Mk2 takeoff



### Publisher

Journal of Aerospace Sciences  
And Technologies  
The Aeronautical Society of India  
Bangalore Branch Building  
New Thippasandra Post  
Bangalore 560 075  
Karnataka, INDIA  
Phone No : +91 80 25273851  
Email: editoraesi@yahoo.com  
Website: www.aerjournalindia.com

### Publication Team

Dr R Balasubramaniam  
Dr S Kishore Kumar  
Dr P Raghothama Rao  
Mrs Chandrika R Krishnan  
Mr Hemanth Kumar R  
Mr Kumaran A K M

### Advertisement – Tariff

A4 – 1 Full Page : Rs. 2000  
Draft Drawn in Favour of  
“Journal Office, The Aeronautical  
Society of India” Payable at  
Bangalore

### Head Quarters

The Aeronautical Society of India  
13-B, Indraprastha Estate  
New Delhi 110 002, India  
Tel: +91 11 23370516  
Fax: +91 11 23370768

**India test-fires K-4 Submarine-Launched Nuclear Capable Missile for the 2nd time in a week**



India successfully test-fired the K-4 nuclear capable submarine-launched ballistic missile off the coast of Visakhapatnam for the second time in the past five days, in a major milestone to augment its strategic arsenal and delivery systems. The missile, developed by the DRDO, has a range of 3,500 km and it will be able to bring almost all parts of Pakistan and several areas of China within its reach, officials said. The missile is being developed for integration with India's Arihant class nuclear submarines. The missile was test-fired successfully for the second consecutive time in the last five days off the coast of Visakhapatnam, the officials said. It was test-fired from an underwater platform, they added. India has been steadily enhancing its strategic weapons which included successful test-firing of nuclear-capable inter-continental ballistic missile Agni 5 with a range of over 5,000 km. In November, India conducted successful night trial of 'Agni-II' surface-to-surface medium range nuclear capable missile with a strike range of 2000 km.

Source: <https://economictimes.indiatimes.com/>

## CURRENT AFFAIRS

### **Gaganyaan On, 4 IAF pilots to be trained in Russia**

India will send four air force pilots to Russia this month to train them as astronauts, as the country's space agency steps up efforts for its maiden human spaceflight in 2022 and is planning a second attempt to land a rover on the moon next year. The Indian Space Research Organisation (ISRO) has earmarked Rs 600 crore towards Chandrayaan-3, a spacecraft that is designed to land on the moon and a rover that would travel 500 metres on the moon's surface, its chairman, Dr K Sivan said here. In September, ISRO's lander Vikram crashed on the moon after the vehicle lost control during descent. The space agency is aiming to test a rocket with an unmanned crew module and a humanoid on board by next year, ahead of the Gaganyaan human spaceflight mission planned for 2022. ISRO has planned for more than 25 missions in 2020, Sivan said. It has sought more than Rs 14,000 crore as budget from the government for its programmes in fiscal 2021, he added. Dr Sivan said the agency was setting up a second spaceport at Kulasekarapattinam in Tuticorin, Tamil Nadu. It will initially be dedicated to for its small satellite launch vehicle (SSLV), which is scheduled to make its first launch this year. "We need around 2,300 acres for this," he said. ISRO is looking at SSLV, a rocket that can be assembled in three to five days for launch, as a vehicle to hurl small satellites — a market where it currently has a lead over other space agencies. ISRO's commercial arm, New Space India, is engaged with industry partners to assemble the SSLV as well as the PSLV, Sivan said. ISRO plans to outsource production of five PSLVs in the next two years. ISRO has got approval to use its navigation with the Indian constellation (NavIC) — the country's own version of GPS — for use on mobile phones, a move that would allow smartphone users to include the feature in their future products. This will help in increasing accuracy during navigation across the country. "NavIC will soon be available for mobile phones. US chipmaker Qualcomm has collaborated with ISRO on this," Dr Sivan said. India has a fleet of nine navigation satellites as part of the Indian Regional Navigation Satellite System. It plans to launch another navigation satellite with a homegrown atomic clock — a key instrument that improves accuracy. In October, Qualcomm said it had included NavIC support to its new chipsets that would be sold to smartphone makers. "The initiative will help accelerate the adoption of NavIC and enhance the geolocation capabilities of mobile, automotive and the Internet of Things (IoT) solutions — with the backing of engineering talent in India," Qualcomm had said in a statement. Separately, an ISRO official said Chinese smartphone maker Xiaomi could release two-three midmarket handsets with the NavIC receiver system later this year. Xiaomi did not respond till press time to queries by ET. Dr Sivan said the Chandrayaan-2 lander, Vikram, crashed on the moon's surface after the extra brake thrust spun the spacecraft out of control, leading to its hard landing.

**Source:** <https://economictimes.indiatimes.com/>

### **National Aerospace Laboratory wants govt. push for Saras Mk2 takeoff**

The government needs to be the "launch customer" to make Saras Mk2 commercially viable, the National Aerospace Laboratory (NAL), which has developed the first indigenous light transport aircraft, told the Parliamentary Standing Committee on Science and Technology. The 19-seater aircraft, developed with a target cost of 150 crore, is at least 20-25% lower in cost than other aircraft in the similar category. The aircraft has been in the making for long. The first prototype flew in 2004. But without the initial push from the government, the manufacturing capacity required for commercial production could not be set up, the NAL said. On a five-day tour of ISRO facilities from December 25 to 30, the committee members visited the NAL on December 28 and were briefed about the aircraft. Later, NAL Director Mr Jitendra J. Jadhav sent a report on the plan for commercial production. Committee chairperson and Congress leader Mr Jairam Ramesh forwarded the report to Rajya Sabha Chairman Mr Venkaiah Naidu. "Our job is to study and recommend. We cannot and should not step into the domain of the executive," Mr. Ramesh said, explaining why he forwarded the report to Mr. Naidu. Presently, the NAL has only one order from the Indian Air Force for 15 aircraft. Connectivity plans :: The NAL has been pitching SARAS Mk-2 for the government's UDAN (Ude Desh Ka Aam Nagrik), since it has the capacity to operate in "ill-equipped", "semi-prepared" and "unpaved airstrips". The scheme, launched in October 2016, is aimed at linking up areas that have no air connectivity. The NAL has said in its report to Mr. Ramesh that the government should be the "launch customer" and place an order for at least 50-60 aircraft, which can be used for VIP services or tackling emergencies in times of natural calamities. "With the firm commitment for procurement from the government, industries will come forward to set up manufacturing infrastructure. This will also push the growth of the micro, small and medium enterprises and allied service sector," Mr. Jadhav said in his report.

**Source:** <https://www.thehindu.com/>

## **GRSE set to deliver Anti-Submarine Corvette INS Kavaratti to Navy soon**

Adding to Indian Navy's firepower, Defence PSU Garden Reach Shipbuilders and Engineers (GRSE -0.65 %) is set to deliver anti-submarine warfare stealth corvette INS Kavaratti to the Navy soon, its Chairman-cum-Managing Director Rear Admiral V K Saxena said. 'Kavaratti' is the last of the four Anti-Submarine Warfare (ASW) stealth corvettes built by the GRSE for the Indian Navy under Project P28, he said. "All trials of the ship have been successfully completed, and we plan to deliver it by the end of this month," Saxena told. 'Kavaratti' will be the 104th ship to be constructed and delivered by the GRSE, he said. With a displacement of 3,300 tonnes, the ship has a carbon composite superstructure, which has been flawlessly integrated with the steel hull through technology developed by the GRSE. "The carbon composite superstructure provides advantage of a lower weight of the warship, thus increasing its stability, manoeuvrability and faster acceleration," Saxena said. The new technology will mean that the warship, which has 90 per cent indigenous components, will also require lower maintenance, he said. The ship is equipped to fight in nuclear, chemical and biological warfare conditions and its weapons and sensors suite is predominantly indigenous, according to Defence sources. The first of the four ASW stealth corvettes under Project P28 - 'Kamorta', was delivered to the Navy in July 2014, 'Kadmatt' was delivered in November, 2015 and 'Kiltan' was delivered in October 2017, a GRSE official said. All these four corvettes under the project are named after islands in the Lakshadweep archipelago in the Arabian Sea, he said. The GRSE currently has a strong order book position of around Rs 27,400 crore under which there are a total of 19 warships at various stages of construction under six projects that are underway, the official said. Of these, five projects are of the Indian Navy and one is of the Indian Coast Guard. The Defence PSU has delivered five warships to Indian Navy in last 10 months, between March 2019 and December 2019, he said.

**Source:** <https://economictimes.indiatimes.com/>

## **Su-30-MKI fighter aircraft equipped with BrahMos to be deployed in northern sector as per threat analysis**

The Sukhoi 30-MKI fighter aircraft equipped with BrahMos supersonic cruise missile will give the Air Force the lethal capability to strike targets at grounds from greater distances and will be deployed in northern sectors as per the threat analysis, said Air Force Chief, Air Chief Marshal RKS Bhadauria. Talking about whether the fighter aircraft will be deployed on borders of China and Pakistan, Bhadauria said, "We will deploy... as per our threat analysis and plans. I would not say where, but we would deploy in the northern sectors. Tasking would be as per the requirement." "It does give us more lethal capability to strike targets at grounds at distances of its capability. There is no doubt, but where they will be used would, of course, depend on the target we get," he said, in response to a question on whether the aircraft would give the stronger capability to the Air Force to do Balakot-type operation. The Sukhoi-30MKI fighter aircraft, equipped with ' BrahMos supersonic cruise missile, was inducted at Thanjavur airbase. The missile can hit targets at around 300 kilometers with precision. Bhadauria said that the decision to deploy the Su-30 MKI at Thanjavur was taken due to its strategic location. "SU-30 with Brahmos is the strongest maritime combination that we have in terms of weapon capability. For that Thanjavur is an ideal location because of the access to both the east and the west side and the Indian Ocean Region (IOR)," he said. On being asked whether the Army has plans to induct more fighter assets in the southern peninsula, "Not fighter assets, but there will be a second Littoral Combat Ship Squadron."

**Source:** <https://economictimes.indiatimes.com/>

## **Air Force's LCA to get Astra firepower, not Rafale's meteor**

The Air Force is keen to make the indigenous Astra missile its standard long-range weapon for fighter aircraft and is promoting its integration on board the Light Combat Aircraft (LCA) as well as other platforms, top officials have told ET. The LCA will not bear Meteor — beyond visual range air-to-air missile (BVRAAM) — that is standard on the Rafale fighter jets, with the French side expressing its reluctance to integrate the weapon with an aircraft equipped with an Israeli-origin radar and the Air Force determined to bring down the heavy imports bill by selecting a home-grown option. "We are not even looking at the French option. We want to promote the indigenous system and have it equipped across all our platforms. The Astra development programme has been satisfactory," a top official said. Sources said after the missile is inducted into the Su30MKI fighter jets from which it has been tested, the system would be integrated on other foreign-origin combat aircraft. The performance of the Astra, sources said, is regarded to be better than similar Russian systems currently in service. User trials for Astra have been completed and the next stage, DRDO officials say, is for the first production order for the missile system. On board the LCA, integration tests are being carried out and the missile is likely to be part of the weapons package for 83 of the Mk1A version that is set to be ordered shortly.

Currently, the missile has a range of over 100 km and has been successfully test-fired against Banshee target aircraft simulating all possible threat scenarios. In the most recent user trials last September, the missile was launched with a warhead against manoeuvring targets that were neutralised, including a direct hit of the target at maximum range. As reported by ET, DRDO is looking to nearly doubling the range of the missile to make it the most lethal weapon in India's air-to-air arsenal. "Astra initially had some technological challenges, which have been overcome successfully. With our persistent effort and with active IAF support, all the user evaluation has been completed and Astra is now ready for induction," DRDO chief G Sateesh Reddy had told ET. Hindustan Aeronautics Ltd (HAL) has played a significant role in modifying the aircraft for weapon integration and over 50 public and private industries are involved in building the Astra weapon system.

Source: <https://economictimes.indiatimes.com/>

### How Sukhoi-30 fighter jets will help check Chinese footprint in Indian Ocean

The Indian Air Force is raising a new squadron of Sukhoi-30 MKI fighter jets at the Thanjavur air force station in Tamil Nadu, a development that will boost the IAF's capabilities in peninsular India and help keep an eye on the Indian Ocean Region where Chinese footprint is growing at a swift pace. The Sukhois will be equipped with the air version of the BrahMos cruise missile. The No. 222 squadron, nicknamed Tiger Sharks, is being raised with six Su-30 fighter jets and it will have its full complement of 18 warplanes by the year-end. Here are eight things you should know about the Su-30s.

1. The IAF has contracted 272 Su-30 MKI fighter planes out of which nearly 260 have been delivered. The remaining 12 jets will be delivered by the end of 2020.
2. The first 50 jets came in ready from Russia; the remaining were being built under licence by the state-owned Hindustan Aeronautics Limited.
3. The IAF inducted its first Su-30 fighter at the Lohegaon air base in Pune in June 1997. A total of 12 Su-30 jets have crashed since the fighter jets were inducted. The IAF is likely to place an order for 12 more jets to make up for the losses.
4. India's Su-30 fleet has been plagued by engine troubles. The Russian-origin fighters have had a history of engine failures or engine-related problems.
5. In the past, the Su-30 fleet has battled poor serviceability, standing at barely 60%. Simply put, only 60 of 100 fighter planes were mission-ready at any given time.
6. India successfully launched the world's fastest supersonic cruise missile, BrahMos, from a specially-modified Su-30 warplane for the first time against a target in the Bay of Bengal in November 2017. The BrahMos missile, an Indo-Russian joint venture, has a range of 290 km.
7. At least two Su-30 squadrons consisting of 18 planes each are likely to be equipped with the 2.5-tonne missile that flies at nearly three times the speed of sound.
8. The BrahMos missile is the heaviest weapon to be deployed on the Su-30. The missile's land and naval variants—500kg heavier than the air launched version—are already in service. BrahMos is now capable of being launched from land, sea and air, completing the tactical cruise missile triad for India.

Source: <https://www.hindustantimes.com/>

### Rajnath Singh to inaugurate induction of Sukhoi fighter jet Su-30 squadron

Union Home Minister Rajnath Singh would inaugurate the induction ceremony of Su-30 fighter squadron at the Air Force Station in Thanjavur in Tamil Nadu, Air Marshal Amit Tiwari said. At a press meet here, Tiwari said this would be the second frontline fighter squadron of the Indian Air Force (IAF) to be based in South. The induction ceremony would take place on January 20 and the fighters would have the most potent platform capable of long reach and multi-role capabilities, he said. The maritime strike squadron inducted in the IAF is also armed with the indigenous Brahmos missile, Tiwari said. The IAF had earlier announced the resurrection of the 222 Squadron, the Tigersharks on January 1 with the Sukhois. The squadron was originally raised on September 15, 1969 with another Sukhoi fighter, the Su-7, and later with the MiG-27 ground-attack aircraft. The newly resurrected 222 Squadron would be operationalised with Brahmos-equipped Sukhoi-30 air superiority fighter with twin engine, the officials said. "The Indian Ocean Region (IOR) which is a central maritime spread, bordering three continents, has an important role to play in regional peace, security and prosperity. The IAF is an intrinsically strategic force and is set to extend the reach into the vast IOR," Tiwari said. The 'Tigersharks', equipped with formidable, state-of-the-art air superiority fighter aircraft, which are armed

with 2.5 ton air-launched BrahMos missile of 300 km range, have the capability to strike from large stand-off ranges on any target at sea or on land with pin-point accuracy by day or night and in all weather conditions. The capability of the missile, coupled with superlative performance of the Su-30 MKI, is set to change the paradigm of maritime surveillance, security and strike in the region.

**Source:** <https://economictimes.indiatimes.com/>

## **ISRO to study tech needed to send Indians to moon**

India's space agency has set up a two-member team to study the technologies needed to send a human mission to the moon, people familiar with the development said. This will be an extension of its human spaceflight programme Gaganyaan. The mission by the Indian Space Research Organisation (ISRO) will need powerful rockets, as well as a capsule to carry human beings and return them safely back to earth. The team is also expected to identify gaps in technologies that ISRO will need to plug before undertaking such a mission. "The team has been formed to look at a (human) mission to the moon," said a space agency official who did not want to be named. It is too early to put a timeline for such a mission, the person said. India's plan to work on human moon mission comes at a time when there is revival of interest globally for a return landing of a human on earth's satellite. US space agency National Aeronautics and Space Administration expects to return to the moon with a man-woman team in 2024. Technology entrepreneurs Elon Musk and Jeff Bezos have also lined up plans for manned missions to the moon with SpaceX's StarShip and Blue Origin's Blue Moon spacecraft around the same time. China, too, has embarked on a human mission to the moon, which is expected sometime in the 2030s. India's mission, however, could take longer, said another person. ISRO usually plans its space programmes with a small team doing a feasibility study, publishing papers and then seeking grants from the government to do technology development. Once the technologies that are strategic to the country are built and demonstrated, the space agency expands it into a programme team and works on a timeline to launch the mission. In most cases, a programme is announced only after government approval. For example, ISRO began preliminary work on its human spaceflight programme in the late 1990s, which it expected to launch in eight years. But, only after the government approved the programme in 2018 did ISRO move it to mission-mode to prepare to send a person to space using its own rocket and crew capsule by 2022.

**Source:** <https://economictimes.indiatimes.com/>

## **India's first manned mission Gaganyaan may take 1 astronaut**

Indian Space Research Organisation (ISRO) chief K Sivan detailed the country's first manned mission to space, saying the four men shortlisted for the programme will receive physical fitness training in Russia for 11 months, but the first spaceflight in December 2021 may carry just one person. Under the mission, named Gaganyaan and expected to cost ₹ 10,000 crore, India is expected to send astronauts, all Indian Air Force pilots, to the low earth orbit, an earth-centred orbit with an altitude of 2,000km where most of the manmade objects in outer space are placed. Prime Minister Narendra Modi announced the space mission from the ramparts of the Red Fort on August 15, 2018, saying that "an Indian son or daughter" will carry the national flag on the trip when the country celebrates its 75th year of Independence in 2022. Sivan, however, confirmed that all astronauts shortlisted for the trip were men. "I cannot reveal the identities of the four individuals shortlisted for the Gaganyaan mission, but all of them are men," the ISRO chief told HT. The astronauts will likely begin their training in Russia from the third week of January, the Indian space agency has said. In Russia, the astronauts will receive physical fitness training in different types of environments to help them acclimatise to travelling in space. "The astronauts will undergo the physical fitness training in Russia for 11 months, after which they will receive module specific training in India. In that, they will train in the crew and service module designed by us, learn to operate it, work around it, do simulations," Sivan said. The ISRO chief said Mysuru-based Defence Food Research Laboratory (DFRL) was preparing a food menu for the mission. "The food for the astronauts is being developed by DFRL. Apart from that, a number of DRDO labs are helping with various aspects of the mission. The space suit is also being designed; Russian help is being taken for that," Sivan said. News agency ANI tweeted that DFRL prepared food items including egg rolls, vegetarian rolls, idlis, moong dal halwa and pulao, along with a food heater. HT could not independently verify the list of food items being developed. Sivan said that even though all four people will receive the complete training, it was likely that only one person would go to space during the first mission, which is scheduled for December 2021. "We are designing the mission for three people to go to low earth orbit for seven days. However, whether we send two people or one person and whether they spend seven days in the orbit or one will be decided later on in the mission after the two unmanned flights. Usually, the first flight is very crucial and even countries such as the USA, Russia, and China sent only one person for the first time and for a very short time –

one orbit, or one day, or even like the USA did only part of the orbit,” said Sivan. The design of the crew and the service module, which will together form the Gaganyaan spacecraft, has been also been completed, the ISRO chairperson said. “The design for the launch vehicle that will be human-rated has also been completed. This is all on paper; the realisation hasn’t started yet. Once the realisation starts, the first model will come and it will go for qualification then the flight model will be made most likely by December this year. When you are planning a mission with humans, all systems have to be more robust; failure rate has to be low,” said Sivan. India’s heaviest launch vehicle, the GSLV Mark III, referred to as “Bahubali”, will carry the module with astronauts to space. It has been redesigned to have a four-metre payload fairing (the top of a launch vehicle where the spacecraft is housed). The mission will take off from the second launch pad at the Satish Dhawan Space Centre at Sriharikota. The launch pad is also being remodelled to allow for human presence. Currently, no one is allowed beyond a distance of around 6km from the launch vehicle once the fuelling has taken place. A committee of external experts has been set up to review the systems and check for robustness. “Usually, for other missions, the review is done by ISRO people, but since humans are involved in the mission, a committee of external experts will review the work,” said Sivan. A humanoid robot that will be sent on the unmanned flight is also taking shape. “This humanoid will basically mimic human functions, will record parameters such as blood pressure, heart rate, etc. This is getting ready. The two unmanned flights will let us ensure whether everything is working well, whether the environment in the modules are controlled, whether it is safe for humans. Like any programme, after two successful test flights, we will undertake the operational flight,” said Sivan.

Source: <https://www.hindustantimes.com/>

## Challakere to be ISRO’s astronaut training hub

India’s world-class facility for training astronauts will come up not in the space headquarters in Bengaluru, nor in any glitzy metropolis. It will be established in three years at Challakere, a shrubby, arid oilseeds town on the Bengaluru-Pune NH4 in Chitradurga district of Karnataka. The Indian Space Research Organisation (ISRO) has proposed a 1 2,700-crore master plan to create top infrastructure that will house its young Human Space Flight Centre (HSFC). K. Sivan, ISRO Chairman and Secretary, Department of Space, told The Hindu, “Everything connected with events and planning of the HSP [Human Spaceflight Programme] will shift to our campus at Challakere. We want to establish a self-contained facility there so that in future, whatever training and activities we are now doing in Russia for the Gaganyaan crew can all be done by us here.” When ready, the 400-acre ISRO land at Challakere will be the single-stop consolidating infrastructure and activities related to space travellers. Hefty sum :: The country pays a hefty, unnamed sum to use such facilities abroad. The first set of four astronaut candidates for the first Gaganyaan mission of 2022 are to train in Russia. The amount sought for the HSFC is over and above the 1 10,000-crore approved budget of Gaganyaan. Pending its approval, the centre may take 2-3 years at the earliest to be set up, but would come up after the first Indian crewed flight. Scattered across centres :: Currently, HSP work is split across various centres such as the Vikram Sarabhai Space Centre in Thiruvananthapuram and the U.R. Rao Satellite Centre in Bengaluru. The Institute of Aerospace Medicine of the Air Force has been roped in for their selection, basic and final training in Bengaluru. Apart from all this work, Challakere will also host work related to crew and service modules of the spacecraft that carries the astronauts and up to mission control. Many more missions :: Such full-fledged facilities, Dr. Sivan said, were needed within the country as the HSP would not be a one-time affair with one Gaganyaan project. “We are going to have a sustained HSP and will need a large number of facilities for training [future] astronauts.” The ISRO has sought the amount outside the 1 10,000-crore budget of Gaganyaan and awaits the government’s approval of its proposal. The HSFC was formally announced in January 2019 and works from a temporary place at the ISRO headquarters, Antariksh Bhavan. S. Unnikrishnan Nair has been named its Founder-Director and R. Hutton the project director of Gaganyaan. Beyond that, the centre is tasked with pursuing future human space missions, complete mission planning, developing engineering systems for survival and safe return of the crew from space, as also selecting and training the astronauts. Quarantine unit :: Human-focussed infrastructure apart, the ISRO also planned to add a quarantine facility at the second launch pad (SLP) in the Sriharikota space port. Dr Sivan said it would ensure that astronauts who were about to enter the spacecraft before the launch stay unexposed. Among many human-rated projects, the SLP and the launch vehicle GSLV-MkIII will also be modified suitably for crew safety and comfort. The Science City :: Challakere, about 400 km and over three hours by road from Bengaluru, is also where premier scientific establishments have set up adjoining and interactive campuses on some 10,000 acres. Called the Science City, it houses facilities of the ISRO, the Defence Research & Development Organisation’s Advanced Aeronautical Test Range, the Bhabha Atomic Research Centre and the Indian Institute of Science. Four candidates :: Four male pilots of the Indian Air Force in their 30s and early 40s are scheduled to leave for Moscow in the third week of January to train at the Yuri Gagarin Cosmonaut Training Centre for 15 months as candidates for Gaganyaan. They were selected through basic fitness and health tests at the IAF’s

Institute of Aerospace Medicine in Bengaluru. In Moscow, they will learn the skills of life and survival in a narrow capsule, before, during and after travelling away from earth's gravity while managing the travel around earth.

Source: <https://www.thehindu.com/>

## India boosts radar satellite count with two launches in 2019

Among the significant but low-profile Indian space missions of 2019 were the launches of two Radar Imaging Satellites, RISAT-2B and RISAT-2BR1. Earth observation (EO) satellites that use a radar, thus giving them all-weather vision, have been around since 1978. India entered this field in 2009 with RISAT-2 using an Israeli built payload. Ten years on, the Indian Space Research Organisation (ISRO) has now increased to four its tally of SAR, or synthetic aperture radar, satellites. And the last two were placed in space in 2019, in a span of just seven months. Indications from ISRO are that at least four more will follow quickly in a year or so, with the fifth one, RISAT-2BR2, likely to be announced fairly soon. India's efforts to add to its complement of EO satellites coincides with a global rush — by public and even more so private space entities — to put up SAR satellites in low-earth orbits. While there was a three-year gap between the first and second Indian SAR satellites (RISAT-2 in 2009 and RISAT-1 in 2012), followed by a seven-year lull, 2019 marked an acceleration in the pace of additions with the country's RISAT tally likely to reach seven — including one or two replacements — in the near future. RISATs have strong strategic, read military, utility. The X band radars of 2B and 2BR1 are said to be useful for military surveillance across our borders. When ISRO resumed this earth observation category in May by launching RISAT-2B, a senior scientist had said that they had assembled it in a record 15 months (it would normally have taken the agency about four years to get these complex satellites ready for space). Why does a country need so many SAR satellites and so fast? While optical imaging based EO satellites capture colour images of patches of earth from 500-600 km overhead, they can do so only when there is sunlight and no cloud or rain. In contrast, a SAR satellite works 24/7, round-the-year in any weather. It bounces microwaves off the earth to sense in detail, the size, shape, height and changes in objects or terrains. The Indian military's border strikes in darkness such as the February Balakot attack could potentially have benefited from such inputs. Based on their frequency bands (X, C, L or S) SAR satellites suit different applications. They can exactly size farms, assess soil moisture, predict harvests, gauge terrain features and infrastructure, appraise water bodies. Above all, they can detect the movement of people on land or ships on sea, clearly indicating the size of objects and structures. Which makes them ideal for border and maritime surveillance. SAR data are also handy for authorities when it comes to deciding crop insurance, compensation, assessing the damage in areas hit by floods and other calamities. A 'SAR up' race :: Radar based EO, a government business with military interest until a couple of years back (and dominated by Canada's RADARSAT for many years) is "now a new kid on the emerging commercial EO (earth observation) block", says space entrepreneur and policy professional Narayan Prasad, founder-COO of space start-up Satsearch based in India and Europe. Currently, about 9-12 start-ups with a clear intent to establish SAR constellations can be counted. Many more, he says, are still in stealth mode. Each one is flooding the lower skies with constellations of 100-kg class micro satellites, offering unprecedented quick revisits and fair views of the ground below to mainly defence agencies. If all of the announced 'eyes in the sky' come up, there could be about 100 commercial micro SAR satellites in the next 3-5 years: a South African space advisory company has called this trend 'SAR wars'. Indian bite :: A private Indian 'SAR sat' may be a far cry but India is tasting the pie in its own way. California start-up Capella Space, which is launching 36 micro SAR sats and has won a U.S. government contract, recently named Remote Sensing Instruments of Hyderabad as its South Asia partner for radar imaging data sales. Quite a few SAR satellite ventures have sought to ride to space on the Indian PSLV. Israel, one of the early SAR birds, flew TecSAR to space on a PSLV in January 2008. (That satellite became the model for RISAT-2, ISRO's first, which had the Israeli core payload.) In the latest launch on December 11, Japanese SAR fleet aspirant iQPS Inc. launched its first satellite, QPS-SAR1, on the PSLV. In January 2018, ICEYE, the Finland-based private micro SAR pioneer, flew the first of its 18 satellites on the PSLV. U.K.'s SSTL has also used the Indian rocket for its NovaSAR. As of November 2018, there were 52 radar imaging satellites of different agencies, says U.K.-based EO consultancy company Pixalytics Ltd. citing the annual update of the Union of Concerned Scientists. (In the previous year there were 49 radar satellites out of 684 EO satellites.) This is still a small percentage in the global total of 710 EO satellites, but the scene is gradually changing.

Source: <https://www.thehindu.com/>

## India plans 5,000-km range Submarine-Launched Ballistic Missile

With the K-4 submarine-launched ballistic missile completing the development stage and ready for induction, the Defence Research and Development Organisation (DRDO) has gone back to the drawing board to develop a 5,000km-

range submarine-launched platform that matches the surface-to-surface Agni-V missile, according to senior officials. The 5,000km-range submarine-launched ballistic missile will carry the same K-series label and will cover all of Asia, parts of Africa, Europe and Indo-Pacific including South China Sea, the officials added. While the details remain classified and the DRDO tight-lipped, the officials said that after testing the 3,500km-range K-4 missile twice in one week, the weapon is now fully developed with fixed parameters and is ready to be inducted on INS Arihant class of nuclear submarines. The solid fuelled K-4 is a three-metre tall missile with accuracy within 100 metres of its over one tonne nuclear warhead. Both the tests were conducted using underwater pontoon off the coast of Vizag on India's eastern seaboard. At present, INS Arihant carries B-05 nuclear missile with a range of 750km, with the K-15 nomenclature being made redundant. However, the DRDO focus is now on a 5,000km-range ballistic missile to join the elite club of US, Russia and Chinese nuclear submarines. According to officials, this missile will match Agni-V in range with a potent destruction capacity. India currently has no plans to develop any other longer-range missile as the 5,000km range will act as a deterrent to all its adversaries in Asia and beyond. "While we have the capacity to build a longer range nuclear missile of intercontinental range, the final decision lies with the government. And no such sanction has been either sought or approved," said a senior official.

Source: <https://www.hindustantimes.com/>

### **K4 test and new fighter base boost India's Act East Policy**

India's decision to test the K4 Submarine Launched Ballistic Missile (SLBM) and to establish a new base of Sukhoi-30 fighter jets not far from the Bay of Bengal coast is adding new teeth to its Act East Policy. It is also reinforcing lines of contact with China's Belt and Road Initiative (BRI) — a giant connectivity project on land and sea. The 3,500-km range K4 missile, which can be launched from Arihant class nuclear submarines, add a new dimension to India's second strike capability—the ability to carry out a retaliatory nuclear attack after absorbing an initial strike by an atomic weapon. The newly acquired heft to carry out a crushing nuclear counterattack with an Intermediate Range Ballistic Missile (IRBM), from a concealed underwater platform, steels India's nuclear deterrent. Nuclear triad :: India has been developing its nuclear triad, enabling launch of atomic weapons from land, air and sea, following the 1998 atomic tests. The K4's 3,500 km reach, which can cover the entire Pakistan and the industrial heartland of China, helps in providing assured deterrence in the region, which includes the 10-nation Association of South East Asian Nations (ASEAN) and other territories in the West Pacific. Symbolically, the K4's launch from the Andhra Pradesh coastline in the Bay of Bengal resonates India's Act East Policy of raising New Delhi's diplomatic and military profile in the Indo-Pacific. The ASEAN centered Act East Policy covers the Malacca Straits—the critical link and trade artery between the Indian Ocean and the Pacific, as well as areas that lie beyond, including some of the island territories in the Pacific. In the West Pacific, China has also been beefing up its nuclear deterrent to counter the accumulation of forces under the United States' Indo-Pacific Command, in Guam, Okinawa in Japan, South Korea and Australia. China's Jin class nuclear submarines deploy JI-12 SLBMs, which have a range of 7,400 km. In tune with its economic rise, China has also been open about enlarging its footprint in the Indian Ocean, with a base in Djibouti. Besides, it is developing the port of Gwadar in Pakistan in the Arabian Sea and Kyaukpyu in Myanmar in the Bay of Bengal, under the BRI flag. India, on its part, has built the deep water port of Sittwe in Myanmar, while Japan, which also has points of friction with China, is constructing the Matarbari deep water port in Bangladesh, in accordance with Tokyo's India backed Free and Open Indo-Pacific strategy. Shortly after the visit of Chinese President Xi Jinping to Myanmar last week, the paths of China's BRI and India's Act East Policy are intersecting again. Government sources told The Hindu that Chief of the Naval Staff Karambir Singh is heading to Myanmar to finalise transfer of one of India's Kilo Class submarine. Sukhoi in Thanjavur airbase :: The unveiling of the Thanjavur airbase last week, where the Su-30 multi-role fighter jets have been deployed, has also reinforced the military dimension of India's Act East Policy. Analysts say that with mid-air refuelling, the Sukhoi would bring the Malacca straits within its strike range. Besides, the Su-30 fighters will deploy the deadly BrahMos supersonic cruise missiles—a highly potent joint venture enterprise of India and Russia. As part of the Act East Policy, Thailand and Philippines are in talks with India to buy BrahMos missiles, the sources said. Philippines had raised a missile unit which, in future, will operate the BrahMos. Thailand is also in talks to join India's coastal surveillance radar chain. Several Indian Ocean littoral states like Maldives, Seychelles, Mauritius and Sri Lanka are already a part of this initiative. Of late, India has signed a series of logistics agreements that extend the Indian military's reach. Apart from the Thanjavur base, the Arakkonam naval air station and the tri-service Andaman and Nicobar Command—both deploying the Navy's P-8I planes—are important spurs of the Act East Policy. These state-of-the-art planes can monitor traffic along the Indian Ocean sea lanes, through major choke points, as well movement of submarines and warships in the area.

Source: <https://www.thehindu.com/>



## **Press Meet - Briefing by Dr. K Sivan, Chairman, ISRO**

A Press Meet was organised today, January 01, 2020, at ISRO Headquarters, Bengaluru on the New Year's Day. Dr K Sivan, Chairman, ISRO addressed and interacted with over hundred media persons during the meet. During the Press Meet, Dr Sivan outlined ISRO's achievements during the last one year and also the plans to be accomplished during the current year. During 2019, six launch vehicle and seven satellite missions were realised by ISRO. The year also marked the 50<sup>th</sup> launch of the Polar Satellite Launch Vehicle (PSLV). Dr Sivan said that two new variants of the PSLV were introduced. For the first time, the spent fourth stage of the PSLV was successfully demonstrated as an experimental orbital platform. Indigenously developed Vikram processor by Semi-Conductor Laboratory was flight tested during the year. International mobile standards body 3<sup>rd</sup> Generation Partnership Project (3GPP) approved India's regional navigation satellite system NavIC which would facilitate NavIC's use in mobile phones. On the capacity building front, a second launch port, exclusively for the Small Satellite Launch Vehicle (SSLV), is planned to be established in Thoothukudi district, Tamil Nadu. "Land acquisition activities are presently in progress", said Dr. Sivan. A second Vehicle Assembly Building in SDSC SHAR Sriharikota was dedicated to the nation during the year for increasing the launch frequency. As part of the enhanced outreach activity, a launch viewing gallery was operationalised in Sriharikota to facilitate viewing of launches live by the public. In an effort towards horizontal expansion of ISRO, Space Technology Cells, Space Technology Incubation Centres and Regional Academic Centres for Space were established during the year and many more such centres are planned in the future. A special programme for school children called "Yuva Vidyani Karyakram (YUVIKA)" aimed at imparting basic knowledge on Space Technology, Space Science and Space Applications was also introduced during the last year. To carry forward the industry production of space systems, ISRO incorporated New Space India Limited (NSIL), under the Department of Space and efforts in realising PSLVs from industry initiated. Pertaining to future programmes, Dr Sivan said Chandrayaan-3 mission to the moon, comprising a lander and a rover is approved by the Government and activities for its realisation are in progress. Talking about India's first human space flight mission Gaganyaan, Dr. Sivan said "We've made good progress in the mission. The process of Astronaut selection for the mission is completed". He further added that four astronauts have been selected, who will undergo extensive training. Other projects during the year include SSLV, GSLV with 4m ogive payload fairing, GSAT-20 satellite, NavIC with indigenous atomic clocks, Indian Data Relay Satellite System, Aditya-L1 and XPOSAT.

**Source:** <https://www.ISRO.gov.in/>

## **MoU between ISRO and IIA**

A Memorandum of Understanding (MoU) between Indian Space Research Organization (ISRO) and Indian Institute of Astrophysics (IIA) for cooperation in the field of Space Situational Awareness (SSA) and Astrophysics was signed by Shri.R.Umamaheswaran, Scientific Secretary, ISRO and Dr.Annapurni Subramaniam, Director, IIA at ISRO Headquarters on 2<sup>nd</sup> January 2020. MOU is signed as part of ISRO's initiatives to utilize the efforts of Indian Academic Institutions in the space technology. This MoU will pave the way for future collaborations between ISRO and IIA in establishing optical telescope facilities under NETRA Project for space object tracking, studies related to space weather, Asteroids, and other Near Earth Objects (NEO). Collaboration between ISRO and IIA will help in progressing various fields of Astrophysics and Astronomy as well.

**Source:** <https://www.ISRO.gov.in/>

## **India's communication satellite GSAT-30 launched successfully**

India's latest communication satellite GSAT-30 was successfully launched from the Spaceport in French Guiana during the early hours today. The launch vehicle Ariane 5 VA-251 lifted off from Kourou Launch Base, French Guiana at 2:35 am IST carrying India's GSAT-30 and EUTELSAT KONNECT for Eutelsat, as scheduled. After a flight lasting 38 minutes 25 seconds, GSAT-30 separated from the Ariane 5 upper stage in an elliptical Geosynchronous Transfer Orbit. With a lift-off mass of 3357 kg, GSAT-30 will provide continuity to operational services on some of the in-orbit satellites. GSAT-30 derives its heritage from ISRO's earlier INSAT/GSAT satellite series and will replace INSAT-4A in orbit. "GSAT-30 has a unique configuration of providing flexible frequency segments and flexible coverage. The satellite will provide communication services to Indian mainland and islands through Ku-band and wide coverage covering Gulf countries, a large number of Asian countries and Australia through C-band" ISRO Chairman Dr K Sivan said. Dr. Sivan also said that "GSAT-30 will provide DTH Television Services, connectivity to VSATs for ATM, Stock-exchange, Television uplinking and Teleport Services, Digital Satellite News Gathering (DSNG) and e-governance applications. The satellite will also be used for bulk data transfer for a host of emerging telecommunication applications." ISRO's Master Control Facility (MCF) at Hassan in Karnataka took over the command and control of GSAT-30 immediately after its separation

from the launch vehicle. Preliminary health checks of the satellite revealed its normal health. In the days ahead, orbit-raising manoeuvres will be performed to place the satellite in Geostationary Orbit (36,000 km above the equator) by using its on-board propulsion system. During the final stages of its orbit raising operations, the two solar arrays and the antenna reflectors of GSAT-30 will be deployed. Following this, the satellite will be put in its final orbital configuration. The satellite will be operational after the successful completion of all in-orbit tests.

**Source:** <https://www.ISRO.gov.in/>

## **YUva Vlgyani KAryakram (YUVIKA) 2020**

Indian Space Research Organisation has launched a special programme for School Children called “**Young Scientist Programme**” “**YUva Vlgyani KAryakram**” from the year 2019. The second session of the programme is scheduled to be held during the month of May 2020. The Program is primarily aimed at imparting basic knowledge on Space Technology, Space Science and Space Applications to the younger ones with the intent of arousing their interest in the emerging areas of Space activities. The program is thus aimed at creating awareness amongst the youngsters who are the future building blocks of our Nation. ISRO has chalked out this programme to “Catch them young”. The programme will be of two weeks duration during summer holidays (May 11-22, 2020) and the schedule will include invited talks, experience sharing by the eminent scientists, facility and lab visits, exclusive sessions for discussions with experts, practical and feedback sessions. 3 students each from each State/ Union Territory will be selected to participate in this programme covering CBSE, ICSE and State syllabus. 5 additional seats are reserved for OCI candidates across the country. The selection will be done through online registration. The online registration will be open from February 03 to 24, 2020. Those who have finished 8th standard and currently studying in 9th standard (in the academic year 2019-20) will be eligible for the programme. Students who are studying in India including OCI (Overseas Citizen of India) are eligible for the programme. The selection is based on the 8<sup>th</sup> Standard academic performance and extracurricular activities. The selection criteria is given below. Students belong to the rural area have been given special weightage in the selection criteria. In case there is tie between the selected candidates, the younger candidates will be given priority. The interested students can register online through ISRO website [www.ISRO.gov.in](http://www.ISRO.gov.in) from **February 03, 2020 (1700 hrs) to 24 February 2020 (1800 hrs)**. The exact link will be available on 03 February, 2020. The list of the provisionally selected candidates from each state will be announced on **02 March, 2020**. The provisionally selected candidates will be requested to upload the attested copies of the relevant certificates on or before **23 March, 2020**. After verifying the relevant certificates the final selection list will be published on **30 March, 2020**. It is proposed to conduct the residential programme during 11-22 May, 2020, at 4 centres of ISRO. The selected students will be requested to report to any one of the ISRO/DOS centres located at Ahmedabad, Bangalore, Shillong and Thiruvananthapuram. The selected students will be accommodated in ISRO guest houses/hostels. Expenditure towards the travel of student (II AC fare by train from nearest Rly Station to the reporting centre and back), course material, lodging and boarding etc., during the entire course will be borne by ISRO. II AC fare will also be provided to one guardian/parent for drop and pick up of student from the reporting centre. For any further clarification, please contact [yuvika2020@ISRO.gov.in](mailto:yuvika2020@ISRO.gov.in) Ph.: YUVIKA Secretariat (Respond & AI) : 080 2217 2269.

**Source:** <https://www.ISRO.gov.in/>

## TECHNOLOGY

### **ISRO sets up academic centre for space in Karnataka**

The Indian Space Research Organisation (ISRO) set up a regional academic centre for space at the National Institute of Technology (NITK) at Surathkal in Karnataka's southwest Dakshina Kannada district, an official said. “The centre at NIT-K will conduct joint research and development in space technology applications to meet the needs of our space programmes,” space agency's director for capacity building PV Venkitakrishnan said in a statement Bengaluru. The state-run ISRO will provide Rs2 crore grant annually to NIT for the R&D projects and promotional activities through the year. The space agency and the engineering institute signed an agreement on the industry-academic collaboration at Surathkal, about 380km from Bengaluru. “The centre, fourth in the country, will also facilitate promoting space technology in the southern states, including Andhra Pradesh, Kerala, Puducherry, Tamil Nadu and Telangana and be an ambassador for capacity-building, awareness and research and development (R&D), said Venkitakrishnan on the occasion. A joint

policy and management committee will guide the centre in optimal utilisation of the research potential, infrastructure, expertise and experience of the space agency and the autonomous institute. "The committee will plan activities like research programmes of common interest and reviewing their projects periodically," said the director. ISRO's visiting scientists and experts in space technology and NIT faculty members and researchers will direct the centre's activities, including projects. "Students of under-graduation (B Tech) and post-graduation (M Tech) will be involved in one-year short-term research projects and 2-4 year long-term projects in advance space programmes," said NIT K Umamashewara Rao. The intellectual property rights (patent) generated in the projects will be jointly owned by ISRO and NITK. The other three such centres are Malaviya National Institute of Technology at Jaipur in Rajasthan, Gauhati University in Assam's state capital and Kurukshetra University at Thanesar in Haryana. In a related development, the city-based space agency also tied up with the state-run Indian Institute of Astrophysics (IIA) for cooperating to develop space situational awareness. "The agreement envisages utilisation of IIA's expertise in astrophysics and astronomy for developing advanced technologies for inter-planetary space explorations," said the space agency's scientific secretary R Umamaheswaran. Both the academic and research institutions will also collaborate in setting up optical telescope facilities under the Netra project for space object tracking, studying space weather, asteroids and near earth objects. "Collaboration will help us progress in various fields of astrophysics and astronomy," said IIA Director Annapurni Subramaniam on the occasion.

**Source:** <https://www.hindustantimes.com/>

### **Navy's LCA programme is on a roll**

A day after its maiden arrested landing onboard the INS Vikramaditya, a prototype of the aircraft successfully undertook its first ski jump take off from the aircraft carrier. A ski jump is an upward-curved ramp on an aircraft carrier's deck to launch jets. The LCA Navy is envisaged to operate from an aircraft carrier with a concept of Ski-jump Take off But Arrested Recovery (STOBAR). Besides the aircraft gets airborne over a ski jump in about 200 m and lands over 90 m using an arrester hook engaging an arrester wire on the ship. "This landmark event demonstrates professional commitment and synergy between various agencies ADA, HAL, CEMILAC and Indian Navy in harnessing the potential of our scientists, engineers & naval flight testing community towards meeting the expectations of the nation," the navy said after the maiden ski jump take off attempt. The maiden arrested landing and the jump take off from the aircraft carrier comes after the aircraft did extensive trials on the Shore Based Test Facility (SBTF) in Goa. This milestone was significant as it enabled India to join a select club of nations for having the capability of deck landing of fighter aircraft. US, Europe, Russia and China have that same capability.

**Source:** <https://bangaloremirror.indiatimes.com/>

### **After Gaganyaan, ISRO sets sights on India's very own SPACE STATION**

The Indian Space Research Organisation (ISRO) aims to undertake more human space flights and also build a station in the outer space, once it successfully completes its maiden mission — Gaganyaan — in 2022, ISRO chairman K Sivan said. Aiming to be the fourth country to launch a human space mission from its own soil, ISRO has identified the first cohort of pilots to be trained for the ambitious programme. "Before Independence Day (in) 2022, we are targeting the first manned mission," ISRO chairman said. "We will sustain that with more (human spaceflight) missions. Then we will have our own space station," he said in an exclusive interview with ET. ISRO has designed an autonomous 3.7 tonnes spacecraft to carry a three-member crew to space, but is likely to have only one astronaut in its maiden human space flight. The high-profile mission — the first after Wing Commander Rakesh Sharma became the first Indian to go to space on a Russian rocket in 1984 — will see four IAF pilots head to Russia later this month to begin an intensive programme to train as astronauts. India has sought Russian help to both train its astronauts and build life support systems in the crew capsule. The spacesuits for the astronauts will also be stitched in Russia, Sivan said. Meanwhile, ISRO will send a humanoid into space later this year, the first of the two unmanned missions, using its most powerful rocket — Geosynchronous Satellite Launch Vehicle MkIII. The rocket will be human rated, that is, fine-tuned to be safe enough with zero or minimum errors to carry a human crew on board. "The humanoid will have systems that simulate human functions," said Sivan. The space agency will carry six micro gravity experiments in the crew capsule during the two unmanned missions. India has earmarked over Rs 10,000 crore for the human space flight mission, which has been in the works for nearly two decades. It moved to mission mode with tight deadlines after Prime Minister Narendra Modi turned the spotlight on the programme in his Independence Day address to the nation in 2018. A plan to send an ISRO scientist to space on a US space shuttle was shelved in 1986 following the Challenger tragedy, when the space shuttle blew up 72 seconds into launch killing six astronauts. ISRO is also launching

dedicated two communication satellites — Indian data relay satellite system (IDRSS) to ensure that the Astronauts are in constant touch with the space agency's scientists on ground throughout the mission. Pointing out the need for a round-the-clock communication system once a human is launched into space, Sivan said of the many options, IDRSS was the least expensive. "I think August 2022 is a somewhat aggressive target given the complexity of human missions to Low Earth Orbit (LEO)," said Susmita Mohanty, CEO of Earth2Orbit, India's first private space startup. "So far, we have tested 2 unmanned capsules for atmospheric re-entry technologies: SRE-1 in January 2007 and CARE in December 2014. ISRO should publish a comprehensive roadmap instead of simply announcing a target launch date." "I think August 2022 is a somewhat aggressive target given the complexity of human missions to Low Earth Orbit (LEO)," said Susmita Mohanty, founder and CEO of Earth2Orbit, India's first private space startup. "So far, we have tested 2 unmanned capsules for atmospheric re-entry technologies: SRE-1 in January 2007 and CARE in December 2014. ISRO should publish a comprehensive roadmap instead of simply announcing a target launch date."

**Source:** <https://economictimes.indiatimes.com/>

## **India's Next-Gen AMCA Fighter Jet should have local engines - IAF to DRDO**

The air force is likely to insist on a clause for development of an indigenous aero engine when it clears a multi-billion dollar programme to go ahead with the next generation Advanced Multirole Combat Aircraft (AMCA) by the Defence Research and Development Organisation (DRDO). The fighters – expected to take to the skies by 2026 as per current projects – are being planned to substitute costly imports of combat aircraft in the future, with the air force keen that a home grown engine be developed for true self dependence. Sources said that while the first two squadrons of the AMCA will be powered by a variant of American origin GE 414 engine, the project will be clearing in the coming months on the condition that a parallel process be initiated by DRDO to develop a aero engine plant with foreign collaboration. "A clear path towards developing our own aero engine is essential and should be done along the AMCA programme which is being supported. If needed, foreign collaboration from western nations that have advanced technologies can be sought," senior officials told ET. The assessment within the Indian establishment is that engine technologies needed for future aircraft are available with nations like France, UK and the US while traditional ally Russia has lagged behind in the field. The Indian side is also keen not to repeat a deficiency in the Chinese weapons development programme where the lack of a reliable aero engine programme is seen as an impediment. As reported by ET, the DRDO has carried out preliminary designs for the AMCA and is confident that it will be in a position to roll out the first test fighter within five years of the project receiving the next stage of financial sanction that is pegged around \$ 1 billion. The air force has put its weight behind the project as well, along with the Light Combat Aircraft. In comments preceding the air force day, Air Chief Marshal RKS Bhadauria had said that "on the fifth generation (requirement), the AMCA has been given a go ahead and we have given it our whole support and are putting in our energies there" and that no imports were planned in the foreseeable future. Plans to develop the indigenous Kaveri fighter jet engine as part of the Rafale offsets deal have not taken off, even though presentations have been made by the French side on creating an aircraft engine ecosystem in India. Similarly, a plan to share jet engine technology under the US-India Defense Technology and Trade Initiative (DTTI) has been suspended last year after little progress was made by the two sides after detailed discussions.

**Source:** <https://economictimes.indiatimes.com/>

## **BUSINESS**

### **U.K. working on government-to-government format for defence deals**

The UK government is working on a government-to-government framework for defence deals in future given India's preference for such an arrangement, Brig. Gavin Thompson, U.K. Defence Adviser in India said. "We have worked very hard since April last year to get all departments in U.K. to get this mechanism. We are at a point where we can send this proposal to the Indian government," Brig. Thompson said. The mechanism needs to be agreed to by both sides, he stated. However, unlike the Foreign Military Sales (FMS) route of the U.S. government where the government levies a small service charge, Brig. Thompson said there are no overheads built into the contract. "It is a lighter model," he stated, adding U.K. presently does not have such a mechanism. In the last few years, India has concluded multi-billion dollar deals through the Inter-Governmental route for Rafale jets, S-400 air defence systems and stealth frigates, among others. During Aero India at Bengaluru last year, U.K. made a pitch to India for collaboration in the areas of aircraft carriers and development of 6th generation fighter aircraft technologies. In this regard, Brig. Thompson said the

Queen Elizabeth class aircraft carriers are 30% of the cost of the U.S. carriers, provide 60% of the sortie rate, and require only 25% of the manning compared to US aircraft carriers. There is also interest in the Indian Navy on the U.K.'s progress in integrated electric-propulsion and have exchanged subject matter experts. Recently, HMS Defender, a Type 45 destroyer, was in Goa and 27 Indian Navy officers went onboard for interactions, the Defence Adviser stated. There are three Memorandums of Understanding (MoU) between the U.K. and India lined up, said Dominic Beales of Defence and Security Organisation in India. While a Defence Equipment Memorandum (DEM) was signed in April last year renewing an earlier agreement, the Logistics MoU has been discussed with Indian officials and "is about to formally enter the Indian system, and the Training MoU is in progress," he stated. "We are looking at collaboration, for co-development and co-IP sharing and exports," Mr. Beales added.

Source: <https://www.thehindu.com/>

### **HAL and Wipro Infrastructure Engineering's Wipro 3D Sign an MOU**

In a first HAL, India's aerospace, and defence company and Wipro 3D, the metal additive manufacturing (AM) business of Wipro Infrastructure Engineering (WIN), have signed an MOU recently to design, develop, prove out, manufacture and repair of Aerospace Components using Metal Additive Technology. This MoU also accentuates development, prove out and application of new material for use in Metal Additive Technology. The path breaking initiative will focus on development, prove out and production of Aerospace applications including MRO, using metal Additive Manufacturing. Prove-outs and certification of components developed using Metal 3D Printing is also a key element of this co-operation. Commenting on the collaboration, Mr. Shekhar Shrivastava, CEO, Bangalore Complex, HAL, said, "This initiative between HAL and Wipro 3D will create a unique synergy of capabilities that can accelerate the adoption of metal additive manufacturing in Aerospace in India. Qualification of parts for Aerospace is challenging as it would require prove out and extensive testing followed by certification by regulatory authorities which may also include flight testing. This cooperation would be a unique opportunity for both the parties. Metal 3D printing has the potential to play a significant role in the success of national aerospace and defense platforms including HAL's own needs." Mr. Pratik Kumar, CEO, Wipro Infrastructure Engineering, said, "This MoU will bring Metal 3D printing into the mainstream of India's Aerospace. Wipro 3D and HAL have worked together in the past. This further strengthens our collaborative efforts to create additive technology leadership in Aerospace." Globally, the Aerospace industry has been one of the foremost adopters of Metal 3D printing due to the benefits of faster design iterations, weight and geometry optimization, performance improvement and flexible manufacturing. Mr. Ajay Parikh, Vice President & Business Head, Wipro 3D, said, "The MoU will provide significant manufacturing and MRO flexibility and freedom to existing, upcoming, and legacy Aerospace programmes. The Additive Technology capability Wipro3D has built over years in Aerospace and Defense verticals will help us in collaborating with HAL" Photo Caption: Mr K Rajamani, GM Engines, HAL and Mr Ajay Parikh, Vice President & Business Head – Wipro 3D signing the MoU as Mr Pratik Kumar, CEO, Wipro Infrastructure Engineering (fourth from the left) and Mr Shekhar Shrivastava, CEO, Bangalore Complex, HAL (fourth from the right) look on.

Source: <https://hal-india.co.in/>

## EVENT

One Day Student Conference on

**“Futuristic Engineering aspects in Aerospace Science & Technology”**

**FEAST - 2020**

on

**28th March, 2020**

**MIT World Peace University, Pune**

**Paud Road, Kothrud, PUNE 411 038 (INDA)**

**For more details contact :**

**Shri . L. K Gite, AeSI - 9422346076**

**Prof. Mangesh Kumar Jadhav, MITWPU - 9975303407**

**feastpune2020@gmail.com**

**<http://aesipune.in> or <http://mitwpu.edu.in/feastpune2020>**

## ADVERTISEMENTS

E-news is bringing out an exclusive slot for individuals to advertise for career opportunities. Industries and Institutions can promote advertise at very nominal charges product ranges as well as airline operators to present route and tariff

**Journal of Aerospace Sciences and Technologies**

**The Aeronautical Society of India**

Bangalore Branch Building

New Thippasandra Post

**Bangalore 560 075**

Karnataka, INDIA

Phone: +91 80 25273851

**Website:** [www.aerjournalindia.com](http://www.aerjournalindia.com)

**Email:** [editoraesi@yahoo.com](mailto:editoraesi@yahoo.com),  
[editoraesi.eneews@gmail.com](mailto:editoraesi.eneews@gmail.com)