



# E-NEWS



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Nadu student**



## TECHNOLOGY



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### India successfully fires heaviest launch vehicle

India leapfrogged into a select group of nations having their own indigenous cryogenic engine technology, when the Indian Space Research Organisation (ISRO) successfully launched its heaviest launch vehicle, GSLV MkIII-D1, and placed the country's heaviest satellite till date, GSAT-19, into a precise orbit. The rocket lifted off from the second launch pad into clear blue skies at 5.28 p.m., and soared above the moon which was rising in the evening, leaving a plume of smoke, a bright orange light shining below the rocket as the cryogenic engine fired up and took the rocket on its intended path. The GSAT-19, a communication satellite, expected to enhance India's communication infrastructure, was placed into a Geosynchronous Transfer Orbit (GTO), 16 minutes after launch, with a perigee (closest point to Earth) 170 km and apogee (farthest point from Earth) 35,975 km. It will take about two to three weeks to be placed in its intended orbit. The satellite weighs 3,136 kg. This successful launch will enable India to launch 4-tonne class satellites from India. These were earlier launched from launch pads abroad. The cryogenic engine, which ignited roughly about 5 minutes after lift-off, and was firing for 640 seconds, "was a culmination of large amounts of work done over decades," Mr A.S. Kiran Kumar, Chairman, ISRO, told a press conference after the launch.



### Russian design

ISRO has been trying to master development of an indigenous cryogenic for decades and has used indigenous cryogenic engines on earlier GSLV flights but modelled mainly on Russian designs. On this GSLV, no technological element was borrowed or adapted from any other space organisation, Mr Somanath S., Director, Liquid Propulsion Systems Centre (LPSC), ISRO, said. The cryo stage is a complex technology. We were making it for the first time; we faced no serious test failures or problems. That is a world record," he said, adding that despite limited resources, "it is a marvel that we were able to achieve this."

### More launches

There are two launches that are coming up, which will however, happen from Ariane in French Guiana. The first one scheduled for June 28, will be the GSAT 18, a 3.3 tonne satellite, and the second one will be a 5.8 tonne satellite.

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

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## CURRENT AFFAIRS

### Black hole spotted by Indian scientists

An Indian team of scientists have managed to spot a black hole, as they tried to make sense of a fresh set of observations related to the identification of a new gravity wave. Black holes are what massive stars in their dying phase become when they turn too heavy and dense for even light — the fastest runner in the universe — to escape their gravitational pull. The scientists were studying a newly discovered cosmic explosion that took place several billion light years away in the constellation Ursa Major. Initially, scientists thought the explosion was related to the gravity wave that had preceded it by 21 hours, but observations made by the Indian space observatory Astrosat and subsequent analysis by Indian researchers ruled out that possibility. “We found that it was a gamma ray burst, which signifies the creation of a black hole,” Mr Varun Bhalerao from the Indian Institute of Technology, Mumbai, who is the lead author of the study, told DH. Gamma ray bursts are extremely energetic explosions seen in distant galaxies. Last week, an international research team had announced the third detection of gravitational waves. Gravitational waves are ripples in the fabric of space and time, which were first predicted by Mr Albert Einstein more than a century ago. While the scientific announcement was made only last week, the wave was first observed on January 4. The gamma ray burst, which Astrosat sensed, came 21 hours later (on January 5) in the same part of the sky. The close proximity of the two events — the gravity wave and the gamma ray burst — had led to a misunderstanding among researchers till the Indian team cleared the air. “We studied the source (GRB 170105A) with radio, optical and X-ray telescopes for few days till it faded away into oblivion. Based on its behaviour, we concluded that this event signalled the birth of a new black hole when a massive star imploded in a galaxy several billion light years away,” said astrophysicist Dipankar Bhattacharaya, from the Inter University Centre for Astronomy and Astrophysics, Pune. Astrosat is India’s first dedicated space probe, launched in September 2015 by the ISRO. Having been in the sky for almost two years, the probe is producing significant results.

Source: <http://www.deccanherald.com/>

### Triumphing over trials, ISRO ready for giant leap

When India fires the high thrust cryogenic engine CE-20 to launch GSLV Mk-III in its first experimental flight from Sriharikota, it will propel ISRO’s biggest dream albeit about 13 years later than it was originally planned. ISRO would have used the CE-20 powered GSLV Mk-III in 2003 if not for the US sanction and a foisted case. The launch, a culmination of a long and arduous journey spanning more than three decades, will set the ball rolling for ISRO’s future projects including Chandrayaan-2 and the manned mission. It will also be a first step towards setting its foot in the global heavy payload market. “If there was no sanction, we would have operationalised GSLV Mk-II in 1999. By 2003-2004, we would have launched what we would be witnessing,” said former ISRO scientist Mr Nambi Narayanan, who was the project director for the development of cryogenic engine in the early 1990s. Even as the Indian space agency struggled over the years to get a cryogenic engine for its heavy launch vehicles, the delay also helped it in mastering the technology. A cryogenic engine involves a tricky job of using liquid hydrogen at -253oC and oxygen at -183oC as fuel and oxidiser. Only the US, Russia, China, Japan and the European Space Agency have achieved this feat. ISRO began work to build indigenous cryogenic engine in the 1970s, though it gained momentum after Russia denied transfer of technology. But it was delayed as the space agency had to focus on their immediate requirements including development of Vikas engine, which now powers both PSLV and GSLV. “With limited resources, manpower and budget, we had to give priority to immediate requirements including projects like SLV, ASLV and PSLV. It was the same team working for all,” said Dr K Sivan, director, Vikram Sarabhai Space Centre. In the late 1980s the erstwhile Soviet Union offered three engines and a technology transfer at a reasonable price. Talks with Japan, US and Europe to borrow cryogenic technology had failed due to prohibitive costs. But after the collapse of the USSR in 1991, Russia backtracked on its pact. Finally when Russia sent seven KVD-1 engines to India after re-drafting the contract post the US sanctions, it was a mix of enthusiasm, confusion and uncertainty, as it was only a supply of hardware and not a technology transfer. “Our technology related questioned were not going to be answered. We were neither able to continue nor able to drop the project,” Mr Narayanan recalled. But soon Mr Narayanan, who was in the thick of things, was arrested on charges of espionage, which further affected the team’s morale. ISRO launched a project to build a cryogenic engine in 1994 and the knowledge their engineers acquired through pilot projects like the development of a 12-tonne thrust engine, one-tonne and seven-tonne engines in the 1980s came in handy. According to ISRO scientists, the engine CE-7.5 can be called an indigenous version, working on a staged combustion cycle, with Russian design. While work to develop a high thrust CE-20 engine began in 2002, the technical issues of its predecessor delayed the project. On April 15, 2010, the engine failed 800milliseconds after ignition during the launch of GSLV-D3 carrying

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GSAT-4 satellite. ISRO used one of the last two Russian engines for their next launch, but the liquid fuel boosters failed. Another attempt at launch using an indigenous cryogenic engine on August 18, 2013 had to be aborted.

Source: <http://timesofindia.indiatimes.com/>

## **HAL WANTS A FULL-FLEDGED AIRPORT**

It is not very keen on operating flights only under UDAN scheme as then it cannot collect landing charges Though Tamil Nadu has offered to open up its Hosur Air Station for Bengalureans under the recently-launched Ude Desh Ka Aam Naagrik (UDAN) scheme, there is also hope that the HAL airport would be a second airport in the city for short-haul flights. However, the defence PSU does not want its airport to be bracketed as an under-served or unserved one that operates flights under the UDAN scheme. It wants the airport to function as a full-fledged one and only then HAL can collect landing charges from the aircraft. Under the UDAN scheme, only aircraft with or below 80 seats are allowed to operate. Aircraft classified in three categories are allowed to operate – with 20 seats or fewer, with 21 to 80 seats and fewer than 80 seats. “Aircraft with 80 seats or less are exempted from paying the landing fee charge at airports. So under the UDAN scheme, airport operators cannot collect landing fees. That is why HAL is keen to make it a full-fledged airport,” a source said. Senior officers of the Airport Authority India (AAI) have already inspected the terminal building for operationalisation of the airport’s civil enclave. Orders were issued a couple of months ago to check the electrical fixtures, air-conditioning and conveyor systems to make it feasible for repair so that systems at the terminal building can be operationalised. “All the obsolete systems are being replaced,” an AAI official said. HAL, which owns the airport, has been requesting the ministry of civil aviation to start operations, saying it has been incurring heavy losses after it ceased commercial operation in May 2008 after the Kempegowda International Airport (KIA) became functional. As per the concession agreement signed between KIA’s developers and the government, no new airport or existing one can operate commercial flights with a 150-km radius (of KIA in Devanahalli) for the next 25 years. The HAL airport, barring the 2013-14 period, has not posted any profit in the last few years. During that year, it posted a profit of Rs 63.98 crore. During 2012-13, it incurred a loss of Rs 44.26 crore and during 2014-15 and 2015-16 it incurred losses to the tune of Rs 11.54 crore and Rs 11.79 crore respectively.

Source: <http://bangaloremirror.indiatimes.com/>

## **Lockheed Martin, Tata announce F-16 India partnership**

Tata Advanced Systems Limited (TASL) has signed an agreement with Lockheed Martin to join hands to produce the F-16 Block 70 in India. The F-16 Block 70 is suited to meet the Indian Air Force’s single-engine fighter needs and this US-Indian industry partnership directly supports India’s initiative to develop private aerospace and defence manufacturing capacity in India, a release said. This F-16 production partnership between the world’s largest defence contractor and India’s premier industrial house provides India with the opportunity to produce, operate and export F-16 Block 70 aircraft, the newest and most advanced version of the world’s most successful, combat-proven multi-role fighter, the release said. F-16 production in India supports thousands of Lockheed Martin and F-16 supplier jobs in the US, creates new manufacturing jobs in India, and positions Indian industry at the centre of the most extensive fighter aircraft supply ecosystem in the world, the release added. “This agreement builds on the already established joint venture between Lockheed Martin and Tata and underscores the relationship and commitment between the two companies,” Tata Sons chairman Mr N Chandrasekaran said. “Lockheed Martin is honoured to partner with Indian defence and aerospace leader Tata Advanced Systems on the F-16 programme. Our partnership significantly strengthens the F-16 ‘Make in India’ offer, creates and maintains numerous new job opportunities in India and the US, and brings the world’s most combat-proven multi-role fighter aircraft to India,” Lockheed Martin Aeronautics executive vice president Orlando Carvalho said.

Source: <http://www.deccanherald.com/>

## **Mars Orbiter Mission Completes 1000 Days in Orbit**

Mars Orbiter Mission (MOM), the maiden interplanetary mission of ISRO, launched on November 5, 2013 by PSLV-C25 got inserted into Martian orbit on September 24, 2014 in its first attempt. MOM completes 1000 Earth days in its orbit, today (June 19, 2017) well beyond its designed mission life of six months. 1000 Earth days corresponds to 973.24 Mars Sols (Martian Solar day) and MOM completed 388 orbits. MOM is credited with many laurels like cost-effectiveness, short period of realisation, economical mass-budget, miniaturisation of five heterogeneous science payloads etc.

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Satellite is in good health and continues to work as expected. Scientific analysis of the data received from the Mars Orbiter spacecraft is in progress. ISRO has also launched MOM Announcement of Opportunity (AO) programmes for researchers in the country to use MOM data for R&D. The success of Mars Orbiter Mission has motivated India's student and research community in a big way. Thirty-two proposals were supported under this AO. A Planetary data analysis workshop was also conducted to strengthen the MOM-AO scientist's research interest. First year data from MOM was released to public on September 24, 2016 through [ISSDC website](#). There are 1381 registered users and 370 GB data has been downloaded. The Mars Colour Camera, one of the scientific payloads onboard MOM, has produced more than 715 images so far. [Mars Atlas](#) was prepared and made available on ISRO website. MOM went through a communication 'blackout' as a result of solar conjunction from June 2, 2015 to July 2, 2015. Telemetry data was received during most of the conjunction period except for 9 days from June 10-18, during superior conjunction. MOM was commanded with autonomy features starting from May 18, 2015, which enabled it to survive the communication 'blackout' period without any ground commands or intervention. The spacecraft emerged out of 'blackout' period with auto control of the spacecraft systems successfully. This experience had enabled the mission team to program a spacecraft about one month in advance for all operations. MOM spacecraft experienced the 'whiteout' geometry during May 18 to May 30, 2016. A 'whiteout' occurs when the Earth is between the Sun and Mars and too much solar radiation may make it impossible to communicate with the Earth. The maximum duration of 'whiteout' is around 14 days. MOM spacecraft experienced the 'whiteout' during May, 2016. However, MOM is built with full autonomy to take care of itself for long periods without any ground intervention. The entire planning and commanding for the 'whiteout' was completed 10 days before the actual event. No commanding was carried out on the satellite in the 'whiteout' period. Payload operations were suspended. Fault Detection, Isolation and Recovery were kept enabled, so as to take care of any contingency on the spacecraft. Master Recovery Sequencer was programmed, to acquire the attitude of the spacecraft and ensure communication with earth even in case of loss of attitude. The spacecraft came out of 'whiteout' geometry successfully on May 30, 2016 and has been normalised for regular operations.

An orbital manoeuvre was performed on MOM spacecraft to avoid the impending long eclipse duration for the satellite. The duration of the eclipse would have been as long as 8 hours. As the satellite battery is designed to handle eclipse duration of only about 1 Hour 40 minutes, a longer eclipse would have drained the battery beyond the safe limit. The manoeuvres performed on January 17, 2017 brought down the eclipse duration to zero during this long eclipse period. On the Evening of January 17, all the eight numbers of 22N thrusters were fired for a duration of 431 seconds, achieving a velocity difference of 97.5 m/s. This has resulted in a new orbit for the MOM spacecraft, which completely avoided eclipse up to September 2017. About 20 kg propellant was consumed for this manoeuvres leaving another 13 kg of propellant for its further mission life.

Source: <http://www.ISRO.gov.in/>

## **Mahindra 's aircraft receives Australia, US safety certifications**

Mahindra Aerospace has received important safety certifications for its Airvan 10, a 10-seater, single-engine turboprop aircraft, from Australian and American authorities. The move opens up a bigger market for the small plane, especially in India, with the government looking to bring 200 smaller airports into the aviation network. Conglomerate Mahindra and Mahindra's general aviation aircraft unit produces Airvan 8 and Airvan 10 aircraft. Mahindra's Australia-based aircraft manufacturer, formerly GippsAero, has been working on the 10-seat version of Airvan 8 utility aircraft since 2011, with its first flight completed in 2012. The company announced that Airvan 10 bagged its FAR 23 Type Certificate from the Australian Civil Aviation Safety Authority, followed by the US Type Certificate issued by the US Federal Aviation Administration. The certification endorses airworthiness standards of smaller airplanes, and relates to structural loads, airframe, performance, stability, controllability and safety mechanisms. SP Shukla, Chairman, Mahindra Aerospace, and Group President - Aerospace and Defence, Mahindra Group, termed the certification a cornerstone for civil aviation. "This certification, under stringent safety standards in place today, aligns with Mahindra Group's focus on introducing world-class products in the fast-changing general aviation world, which will be dominated significantly by turboprops in this class of aircraft," he said. He added that it enhanced the company's global reach, with a specific focus on large markets for regional connectivity such as India, the US and Africa. Airvan has not yet received approval from the Directorate General of Civil Aviation. However, the aircraft is certified in over 42 countries, and over 220 Airvan 8s are in service.

Source: <http://www.thehindubusinessline.com/>

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## **NASA says 'we are not alone' as it reveals 10 new Earth-like planets which could sustain life**

U.S. space agency NASA announced the discovery of more than 200 new planets, 10 of which are believed to be about the right size and temperature to support life. Of the 219 new suspected planets to have been discovered by NASA's Kepler telescope, 10 were found to exist in the so-called 'Goldilocks zone' of their solar system. This refers to the distance between the planet and their star, which is neither too hot nor too cold to support complex life. The presence of liquid water on these "rocky" Earth-like planets is seen as a key ingredient required for the existence of life. "Are we alone? Maybe Kepler today has told us indirectly, although we need confirmation, that we are probably not alone," Mr Mario Perez, Kepler program scientist, said at a news conference. NASA launched the Kepler telescope in 2009 in a bid to discover whether other Earth-like planets are common or rare. The latest identification of suspected exoplanets – planets outside our own solar system – brings the tally discovered by the Kepler telescope to 4,034. The number of worlds thought to be approximately the same size and temperature as Earth is around 50. One of astronomy's 'most compelling questions' In a tweet, Nasa said, "Scientists using @NASAKepler have identified 219 potential new worlds!" The Kepler telescope recognizes the presence of planets by measuring the change in brightness of a star caused when a planet passes in front of it, otherwise known as a transit. "This carefully-measured catalog is the foundation for directly answering one of astronomy's most compelling questions – how many planets like our Earth are in the galaxy?" Susan Thompson, a Kepler research scientist and lead author of the latest study, said. Last month, high-profile physicist Mr Stephen Hawking, warned that humans would need to colonize another planet within the next 100 years or face the threat of extinction.

Source: <http://www.cnbc.com>

## **Mission To Discover Alien Life Given Green Light**

A deep-space mission to discover habitable Earth-sized planets in other solar systems and detect extra-terrestrial life they may host has been given the go-ahead by the European Space Agency (ESA). Planetary Transits and Oscillations of stars (PLATO) mission will be launched into the 'L2' virtual point in space - 1.5 million kilometres beyond the Earth, as seen from the Sun - and will monitor thousands of bright stars over a large area of the sky. The satellite will search for tiny, regular dips in brightness as their planets cross in front of the stars, temporarily blocking out a small fraction of the starlight. The PLATO mission led by University of Warwick in the UK will address fundamental questions such as "how common are Earth-like planets?" and "is our solar system unusual or even unique?" and could eventually lead to the detection of extra-terrestrial life. In addition, PLATO will also investigate seismic activity in some of the host stars, and determine their masses, sizes and ages - with unprecedented accuracy - and helping to understand the entire exoplanet system. The ESA Science Programme Committee meeting on June 20 agreed to the adoption of the PLATO mission, following its selection in February 2014. This means it can move from a blueprint into construction. "The launch of PLATO will give us the opportunity to contribute to some of the biggest discoveries of the next decade answering fundamental questions about our existence, and could eventually lead to the detection of extra-terrestrial life," said Professor Don Pollacco, the PLATO Science Coordinator and Professor of Physics at Warwick. In the coming months, industry will be asked to make bids to supply the spacecraft platform. Its payload and control and analysis software will be constructed by agencies and institutes across Europe, researchers said.

Source: <http://www.ndtv.com/>

## **ISRO-made system to alert users at unmanned level crossings**

This will be of great help to passengers as currently train movements are tracked manually. Satellite-based chip systems will now alert road users at unmanned level crossings about approaching trains and also help in tracking train movement on a real-time basis. On a pilot basis, the Mumbai and Guwahati Rajdhani trains will be equipped with this system. Road users will be warned by hooters once a train approaches an unmanned level crossing as railways are installing ISRO-developed integrated circuit (IC) chips on locomotives of trains. There will be hooters at 20 unmanned level crossings on Rajdhani routes for Guwahati and Mumbai, said a senior Railway Ministry official involved with the project. More trains will be equipped with such technology in a phase-wise manner, according to the plan. About 500 metres before the level crossings, the hooter will be activated through the IC chip, warning road users as well as the train driver near the crossing. The hooter will be louder as the level crossing nears, and finally it will be silent after the train passes by. Besides alerting road users, the satellite-based system will also be used for tracking trains for disseminating information about their movement on real time basis. This will be of great help to passengers as currently train movements are tracked manually. Safety at unmanned level crossings is a cause of serious concern for

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railways and the public transporter is exploring various ways to address the issue. There are about 10,000 unmanned railway crossings in the country which account for around 40 per cent of accidents involving the railways. While the Railways have eliminated 1,148 unmanned crossings in 2014-15 and 1,253 in 2015-16, it has scaled up its target and now plans to eliminate all such crossings in the next 2 to 3 years, the official said. The satellite-based system will also help railways in mapping the area and the technology will come in handy at the time of accidents when it can be used to ascertain the exact location of trains and topography.

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

## **Mahindra Aerospace 10-Seat Turboprop Receives FAA, CASA Certification**

Mahindra Aerospace has received a FAR 23 type certificate from Australia's Civil Aviation Safety Authority for its Airvan 10, the company said. Australia's first 10-seat, single-engine turbine aircraft has also received a type certificate from the FAA. "This [certification] comes as a cornerstone for civil aviation," said Mr S P Shukla, chairman of Mahindra Aerospace and group president of aerospace and defense for Mahindra Group. "This certification under stringent safety standards in place today aligns with Mahindra Group's focus on introducing world-class products in fast changing general aviation world, which will be dominated significantly by turboprops in this class of aircraft. Today's certifications enhance our global reach further, with specific focus on large markets for regional connectivity, such as India and Africa." Mahindra is based in India, while its subsidiary, manufacturer GippsAero, is based in Australia. "For our Australia and India teams, this is a much deserved recognition. This now gives us an opportunity to progress into the next stage of the program, which will address customer and region-specific enhancements to the aircraft," said Mr Keith Douglas, CEO of GippsAero. "We expect delivery of the first aircraft to identified customers by the early 2018. There has been a significant demand for such an aircraft in expanding general aviation turboprop market and we are confident we will fill the gap by providing this cost effective solution." Mahindra Aerospace said its Airvan 10 is the turbocharged version of the Airvan 8. The Airvan 10 is powered by a Rolls-Royce 250 B-17, which produces 450-shaft horsepower. It's because of the engine, Mahindra Aerospace said, that the Airvan 10 is "the most economical 10-seat turboprop in its class." It can perform missions including skydiving, passenger transport, freight, recreation and others. The Airvan 10's typical cruise speed is 145 KTAS and has a certified ceiling of 20,000 feet. It has a wingspan of over 40 feet, with a 50-inch cabin door.

Source: <http://www.aviationtoday.com/>

## **Communication satellite GSAT-17 launched from French Guiana**

GSAT-17, the country's newly launched communication satellite, will soon join the fleet of 17 working Indian communication satellites in space and augment their overall capacity to some extent. The 3,477-kg spacecraft was released into a temporary orbit in space as planned at 2.45 a.m. [a.m.] IST about 39 minutes after launch from the European space port of Kourou in French Guiana. It was dusk at the South American near-equatorial space port. GSAT-17 was sent up as the second passenger on the European booster, Ariane-5 ECA VA-238, according to ISRO and the European launch company Arianespace. GSAT-17, built mainly for broadcasting, telecommunication and VSAT services, carries over 40 transponders. It also has equipment to aid meteorology forecasts and search and rescue operations across the sub-continent. "GSAT-17 is designed to provide continuity of services of operational satellites in C, extended C and S bands," ISRO said. The satellite was released into what is called a temporary 'geosynchronous transfer orbit' or GTO, where it started orbiting distant 249 km at the near end to Earth and 35,920 km at the farthest point. Its operations were immediately taken over by the spacecraft command team at the ISRO Master Control Facility in Hassan.

### **ISRO's new communication satellite**

- Launched on: June 29 at 2.45 a.m. [IST]
- Mass: 3,477 kg
- Life: 15 years
- Cost: ₹ 1,013 crore, including launch fee
- Launch vehicle: European booster Ariane-5 ECA/ VA238

"Preliminary health checks of the satellite revealed its normal functioning. In the coming days, orbit raising manoeuvres will be performed to place GSAT-17 in the geostationary orbit (36,000 km above the equator) by using the satellite's propulsion system in steps," ISRO said. It normally takes around two weeks to reach and settle in its planned slot over India at 93.5° East longitude. Meanwhile its various functional appendages such as antennas and solar arrays are deployed. The spacecraft was approved in May 2015 with an outlay of ₹ 1,013 crore, including its launch fee and

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insurance. Its co-passenger was the 5,700-kg Hellas Sat 3-Inmarsat S EAN shared by two satellite operators. ISRO Chairman Mr A.S. Kiran Kumar has earlier said they need double the number of communication spacecraft to support various users across the country. ISRO does not yet have a launcher that can lift payloads above 2,000 kg. As such it must hire foreign launch vehicles — mostly of Arianespace — to put its heavier communication spacecraft in orbit. Only this month, it tested its first GSLV-Mark III vehicle which can do this job for it. “Today, GSAT-17 became India’s third communication satellite to successfully reach orbit in the past two months,” said an official release. It launched GSAT-19 on the new MkIII on June 5 and the 2,230-kg GSAT-9 or the South Asia Satellite on May 5, both from Sriharikota. Designed and assembled at the ISRO Satellite Centre in Bengaluru, GSAT-17 has been at the Kourou space port since May 15, undergoing pre-launch checks and tests. Project Director Prakash Rao and a rotating team of over 20 ISRO engineers were attending to it during the period, said an ISRO official. Arianespace said this was its 21st Indian launch since the APPLE experimental satellite of 1981. ISRO’s upcoming 5,000-kg-plus advanced and heaviest satellite, GSAT-11, will also be launched by Arianespace. GSAT-17’s co-passenger has two operators. Hellas Sat 3 provides direct to home television and telecom services across Europe, West Asia and South Africa. Global satellite operator Inmarsat will provide in-flight Internet facilities for European airlines, as signified in the satellite’s tag EAN or European Aviation Network.

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

## TECHNOLOGY

### **NASA to launch world’s first mission to Sun in 2018**

NASA is set to launch the world’s first mission to the Sun next year, that will explore our star’s atmosphere and answer questions about solar physics that have puzzled scientists for over six decades. The Parker Solar Probe has been named in honour of pioneering astrophysicist Eugene Parker, who predicted the existence of the solar wind nearly 60 years ago, the US space agency announced yesterday. “This is the first time NASA has named a spacecraft for a living individual,” said Mr Thomas Zurbuchen, associate administrator for NASA’s Science Mission Directorate. The spacecraft, about the size of a small car, is loaded with technological breakthroughs that will solve many of the largest mysteries about our star, including finding out why the Sun’s corona is so much hotter than its surface. Mr Parker Solar Probe will travel through the Sun’s atmosphere, closer to the surface than any spacecraft before it, facing brutal heat and radiation conditions — and ultimately providing humanity with the closest-ever observations of a star, NASA said. To perform these unprecedented investigations, the spacecraft and instruments will be protected from the Sun’s heat by a 4.5-inch-thick carbon-composite shield. The spacecraft is set to be launched during a 20-day window that opens on July 31, 2018 from NASA’s Kennedy Space Centre in Florida. “The solar probe is going to a region of space that has never been explored before,” said Mr Parker, Professor at the University of Chicago in the US. “It is very exciting that we will finally get a look. One would like to have some more detailed measurements of what is going on in the solar wind. I am sure that there will be some surprises. There always are,” Mr Parker said. In the 1950s, Mr Parker proposed a number of concepts about how stars — including our Sun — give off energy. He called this cascade of energy the solar wind, and he described an entire complex system of plasmas, magnetic fields and energetic particles that make up this phenomenon. Mr Parker also theorised an explanation for the superheated solar atmosphere, the corona, which is — contrary to what was expected by physics laws — hotter than the surface of the Sun itself. Many NASA missions have continued to focus on this complex space environment defined by our star — a field of research known as heliophysics. “Parker Solar Probe is going to answer questions about solar physics that we have puzzled over for more than six decades,” said Mr Parker Solar Probe Project Scientist Nicola Fox, of the Johns Hopkins University.

Source: <http://www.thehindubusinessline.com/>

### **ISRO launches GSLV-MK III: Scientists call India’s heaviest rocket ‘Bahubali’**

Jubilant ISRO scientists hailed the successful launch of India’s heaviest rocket GSLV MKIII-D1 and called it “Bahubali” and “obedient boy”. ISRO launched the country’s heaviest satellite — GSAT-19 — on its first developmental flight. “Proud to say ISRO has given birth to a Bahubali,” said Mr Tapan Misra, director of Space Applications Centre (SAC) of Indian Space Research Organisation (ISRO), as chuckles broke out at the mission control centre in Sriharikota. Mr PV Venkita Krishnan, director of ISRO propulsion complex, described the launch vehicle as a “game-changer” and said it had made “quantum leaps in terms of hardware”. There were more of “swadeshi components” and “minimal” hardware from outside, he said. “It has been written that this rocket is monstrous. But it really is a giant vehicle, in terms of capacity and payload capability,” he said. Another senior scientist, involved in the development of cryogenic

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stage, called the launch vehicle “smart and the most obedient boy”. “It’s a technological marvel and a masterpiece which has added almost 56% of incremental velocity and placed the satellite in the GTO (geosynchronous transfer orbit) by giving a total incremental velocity of 37,000 kmph,” he said. With success, India has “mastered” the complex and high performance cryogenic technology and joined an elite group of a few countries that possess this technology, he added. Mr K Sivan, director, Vikram Sarabhai Space Centre, said the successful launch marked the commencement of two major technologies. “One is indigenous 100% desi heavy-lift launch vehicle which is capable of lifting twice the capability of (existing) ISRO vehicles. “Second is advanced high turnout satellite which presents higher data rate. These two technologies in the days to come are going to create revolution in the application of space technology for common man in a cost effective and more efficient way,” he said.

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

## **THIS AIRSHIP CAN TAKE YOU PLACES, LITERALLY**

A city-based aviation firm is developing an Zeppelin like airship which can be deployed for search, rescue and surveillance purposes. The helium-based airship which can fly at an altitude of up to 10,000 feet and at a speed of 40 to 50 knots will have a seating capacity of eight to ten passengers including the crew. “Airships are cost effective and also environmentally-friendly when compared to conventional aircraft and helicopters. They do not require a runway to takeoff and land,” said Capt Mr Ashwin Belmar, director, Belmar Aviation which is developing the Airship. The firm which said that it’s the first of its kind attempted in India has already completed the airship’s design and has applied for an experimental manufacturer’s certificate with the concerned regulatory authorities. “Once we get the license we can start the development of the prototype which we are confident of completing by the end of the year,” Belmar said. The firm will develop the prototype at its facility in Hoskote and a German design company will be roped in for designing the airship. “The airship to be built using the dacron fabric will be powered by solar and electric batteries. To start off with we would be developing an experimental eight to ten seater airship ,” said Mr Madhusudan, director Belmar Aviation. The airship which will be on the B-class blimps operated by the US defence forces though is being primarily designed for search, rescue and surveillance purposes it can also be used for other applications. “It can be used for transportation purposes to connect small towns and villages as the airship does not require a landing strip unlike an aircraft to operate. Besides it can also be converted into a floating hotel,” said Mr Madhusudan. He added that the cost for developing an airship can vary between Rs 50 lakh to Rs 1 crore depending on the size its size and the type of avionics it carries.

Source: <http://bangaloremirror.indiatimes.com/>

## **ISRO to flight-test kerosene-based semi-cryogenic engine by 2021**

If things go as planned, the Indian Space Research Organisation (ISRO) will flight-test the semi cryogenic engine, which uses refined kerosene as propellant, by 2021. With the success of the Geosynchronous Satellite Launch Vehicle Mk-III (GSLV Mk-III), ISRO’s Liquid Propulsion Systems Centre (LPSC) here at Valiyamala is now focusing on the next level - the development of the much-delayed semi-cryogenic technology. Unlike the cryogenic engine which uses a combination of liquid hydrogen (LH2) and liquid oxygen (LOX) as propellant, the semi-cryogenic engine replaces liquid hydrogen with refined kerosene (ISRO sene as ISRO calls it). LOX will be retained as oxidiser. “Various tests are in progress on the engine. Of the four turbo pumps in it, three have undergone tests at the ISRO Propulsion Complex, Mahendragiri. We plan to have the engine ready by 2019 end, the stage by 2020-end and the first flight by 2021,” Mr S Somanath, director, LPSC, said. LPSC had developed the cryogenic engine for the GSLV Mk-II and the much powerful one for the GSLV Mk-III. The idea is to replace the second stage of the GSLV Mk-III, which now uses a liquid stage, with the semi-cryo. The rocket will retain the cryogenic upper, third stage. The advantage of inducting the semi-cryogenic stage is the payload capacity of the GSLV Mk-III will increase from four tonnes to six tonnes. Using refined kerosene as fuel has quite a few advantages: It is eco-friendly and cost-effective. Also, unlike liquid hydrogen - which has to be stored at (-)253 degree Celsius, it is stable at normal temperature. The Union Cabinet had cleared the semi-cryogenic engine project in 2008 at an estimated cost of Rs 1798 crore. Although the idea was to develop the technology 2014, the project got delayed.

### **Fingers crossed**

Semi-cryogenic engine uses refined kerosene as propellant

It’s eco-friendly and cheaper

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The Union Cabinet had cleared the project in 2008

ISRO hopes to flight-test it in 2021

Engine to be ready by 2019-end

Source: <http://www.newindianexpress.com/>

## **Drones can reach heart attack patients faster than ambulances**

Drones equipped with a portable medical device can help save lives of heart attack victims by reaching the spot four times faster than an ambulance, a new study has found. Researchers from Karolinska Institutet in Sweden compared the time taken to deliver an automated external defibrillator (AED) using fully autonomous drones for simulated out-of-hospital cardiac arrest (OHCA) with emergency medical services (EMS). A drone was developed by the Swedish Transportation Agency and was equipped with an AED, a portable device that checks the heart rhythm and can send an electric shock to the heart to try to restore a normal rhythm. The drone was equipped with a global positioning system (GPS) and a high-definition camera and integrated with an autopilot software system. It was dispatched for out-of-sight flights to locations where OHCA were within a 10 kilometre radius from the fire station. Researchers noted that the drone arrived more quickly than EMS in all cases with a response time of 16:39 minutes. "Saving 16 minutes is likely to be clinically important. Nonetheless, further test flights, technological development, and evaluation of integration with dispatch centres and aviation administrators are needed," researchers said.

Source: <http://www.business-standard.com/>

## **Self-flying planes set to take off next year**

Boeing Co is looking ahead to a brave new world where jet liners fly without pilots and aims to test the technology next year, the world's biggest plane maker has said. The idea may seem far-fetched but with self-flying drones available for less than \$1,000, "the basic building blocks of the technology clearly are available", said Mr Mike Sinnett, Boeing's vice-president of product development. Jetliners can already take off, cruise and land using their onboard flight computers and the number of pilots on a standard passenger plane has dropped to two from three over the years. Mr Sinnett, a pilot himself, plans to test the technology in a cockpit simulator this summer. The new technology would allow artificial intelligence to make some of the decisions normally made by pilots. If all goes well, Mr Sinnett says the technology could be tested on a real aircraft sometime next year. Airlines are among those backing the idea, in part to deal with a projected need for 1.5 million pilots over the next 20 years as global demand for air travel continues to grow. Self-flying aircraft would need to meet the safety standards of air travel and also need to convince regulators. A self-flying plane would need to be able land safely as Captain Chesley Sullenberger did in the "Miracle on the Hudson", Mr Sinnett said, "If it can't, then we can't go there." A US Airways plane hit a flock of geese shortly after taking off in 2009 knocking out its engines but Sullenberger managed to glide the Airbus A320 to a safe landing on the Hudson River, saving all 150 passengers on board. You may soon travel between cities while staying in your hotel room When you go out of town, you usually need to buy a few nights at a hotel in addition to a plane, train, or bus ticket. Brandan Siebrecht, a graduate architecture student at the University of Nevada, US, wants to combine these components into one experience. He has designed what he calls the "Hyperloop Hotel", a system that would feature a transit system and 13 hotels in different cities throughout the US.

Source: <http://www.gadgetsnow.com>

## **Drones bring new dimension to archaeology**

These days, unmanned aerial vehicles (UAV) can be spotted above the historic Amer Fort, located on a hill about 11 km from Jaipur. A similar activity can be seen between 11 am and 1 pm over the Kumbalgarh Fort on the westerly range of the Aravalli Hills in Rajasthan. The UAVs or drones, as they are better known, circle the area around the two historic monuments recording every piece of information not visible to the human eye. The information collected by the drones will help the Rajasthan government create a complete 3D replica of the historic monuments. This 3D model on the computer can be used for re-construction and planning for maintenance of the two hill forts — both UNESCO World Heritage Sites. The drones are being deployed by Quidich Innovation Labs as part of the Rajasthan government's efforts to digitise its monuments and ease their conservation and preservation. "Traditional equipment aims laser beams at surfaces, records the reflected light and reconstructs a 3D image of the space. Instead, the images and

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video from drones allow the inspection of a high level wall top or roof more accurately. You can get the 3D view from the top and that is a critical problem that drones solve,” Quidich founder and CEO Mr Rahat Kulshreshtha told *BusinessLine*. In the picturesque Diu district of the Daman and Diu, the administration has invited tenders for a similar project to use technology and drones to survey Fort Diu, built in 1535 by the Portugese. “There is a lot of active perusal of mapping large heritage sites for tourism, records, measurements and analysis purposes,” says Mr Ankit Mehta, co-founder and CEO of drone-maker ideaForge Technology. He points out that traditional laser scanning has resolution limitations and does not offer colours. “In photogrammatery (using drones), you click multiple series of images within a short span and a software stitches them back. The result is images in all of their colour and texture. You can reach a very low resolution,” he says. Moreover, drones also capture other data for survey and conservation work.

## Cost-effective

The other big advantage of using drones is reduction in costs as well as time. Typically, drone service providers charge ₹ 1,500-2,000 to survey an area of one hectare. The cost of using laser technology in the same area will be at least three to four times this amount.

“Also, the work that earlier took 6-8 eight months can be done in less than a week of data collection through drones,” says Mr Kulshreshtha.

Source: <http://www.thehindubusinessline.com/>

## NASA launches world's smallest satellite designed by 18-year old Tamil Nadu student

India, created history after NASA launched the world's smallest satellite, built by 18-year old Tamil Nadu student Mr Rifath Sharook and his team. Named as Kalamsat, after former President APJ Abdul Kalam, the tiny satellite weighs around 64 grams. According to news agency ANI, the satellite was flown into the space in a NASA sounding rocket from a NASA facility in Wallops Island. With the launch of the satellite, India has created a global space record. Speaking to ANI, Sharook said that the achievement would not have been possible without the support of his team. “It's a 3D printed satellite. It is for the first time that 3D printing technology is being used in space. We have made history. The world's smallest satellite has been launched in space. It was not possible without my team,” he said. The project was carried out under the supervision of Dr. Srimathy Kesan, founder and CEO of Space Kids India. Speaking to Times of India, Mr Kesan said the satellite separated from the rocket 125 minutes after it took off. She further added the NASA will recover the satellite and will send it back to them for recovering of the data. “Kalamsat fell into the sea. It will be recovered and NASA will be sending it back to us for decoding the data,” Mr Kesan told TOI. Describing the launch as “divine intervention”, Mr Kesan further added that the 3.8 cm cube structured-satellite can fit in one's palm and is fully 3-D printed. Equipped with nano Geiger Muller counter for measuring the radiation in space, the satellite is built with reinforced carbon fiber polymer. “Space is not unreachable... Space has got no boundaries and therefore, let's all do research together and let's conquer Mars soon,” Mr Kesan was quoted by ANI as saying.

Source: <http://indianexpress.com/>

## BUSINESS

### CSIR faces fund crunch, asks labs to look outside

The Council of Scientific and Industrial Research is staring at a fund crunch this year. A letter from the organisation's chief, Dr Girish Sahni, to directors of all of the organisation's 38 labs says that the funding is “tight” and that labs have to look outside of the CSIR to meet their expenses. In any given year, the CSIR— with a ₹ 4,000 crore annual budget — apports out about ₹ 1,200-1,400 crore to its labs for research. This year, according to Dr. Sahni's letter, only about ₹ 360 crore would be available.

### Higher salaries

The crunch was primarily due to the organisation having to meet with increased salary outgo from recommendations of the 7th Pay Commission and a ₹ 1650 crore-hit towards meeting its pension requirements. These expenses are likely to spill over into the future.”... Thus, the balance available for lab allocations and various new research projects (including 12th Plan leads, Mission projects etc) is only ₹ 360 crore. Of this, a sum of ₹ 158 crore has already been allocated. If we were to release further sums under these heads, we will be left with no funds to support new research

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projects. This is the stark reality," Dr. Sahni's letter said. Dr. Sahni, who's in Africa on business, told the *The Hindu* that while he had "requested the government for more support", several scientists had to "change their mindset and produce value from R&D in keeping with the CSIR mandate."

## Dehradun Declaration

In 2015, the CSIR decided that as part of a Dehradun Declaration under Science Minister, Mr Harsh Vardhan's leadership, to generate about 50% of its budget through external sources. Some scientists, who spoke to *The Hindu*, described the funds crunch as a "panic situation" and a result of the NDA government's move to scrap the Planning Commission (which allowed the CSIR to access budget research money for a 5-year period) and replace it with a yearly-accounting system. "There is no money for new projects next year effectively," said one of them, "because the message from above is to make money." *The Hindu* has previously reported on several projects not being funded. Dr Sahni's letter also said the CSIR would immediately move towards a regime of ensuring that 50% of Council's budget by 2020 would come from external sources and this year at least 25% be met that way. "We are already generating 10%-15%..so I don't see this as impossible," Dr. Sahni told *The Hindu*. Anjan Ray, Director of the CSIR-Indian Institute of Petroleum, said the fund crunch was an opportunity and part of a CSIR effort to reorganize itself. "Earlier, labs were organised around say, 'chemistry' and 'biology' and now we are thematically organised: Energy, Pharma to strengthen links with industry. This also improves accountability of public funding."

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

## Why CSIR and other science labs should be given more funds, not less

The Council of Scientific and Industrial Research (CSIR) is among the country's largest research and development organisations. This year a letter from the director general has informed all of its 38 that they will have to generate their own funds to keep the labs running. This has been the trend since 2015, when as part of the Dehradun Declaration, the CSIR decided that about 50% of its budget would have to be raised from external sources. This, coupled with the 7th pay commission requirements, has left the CSIR with only Rs.360 crore instead of the usual Rs.1,400 crore annual budget for research labs this year. All indications are that this fund crunch is expected to continue in the years to come. Higher science in India is already a very under nourished area. In many colleges and universities, even basic equipment and materials are hard to come by. The state of labs in premier universities for masters and doctoral scholars leaves much to be desired. At a time when countries such as China and South Korea are increasing the funding allocated to cutting edge research in science, India's cutting the budget will make it that much harder to compete in an international stage. This puts additional pressure on CSIR-funded research labs to raise funding from the industry. The pressure to conduct research in only those areas which are profitable and can be sold to the industry will make it harder for scientists to focus on areas of fundamental research in core sciences that may or may not have profitable applications. In attempting to make academic research more industry-friendly, the government and CSIR must not lose track of the ultimate aim of research which is to push the boundaries of human understanding and scientific knowledge. Fund cuts to higher education, be it in the sciences or in the liberal arts and humanities, will only make it harder for researchers to continue to work in the country. Many scholars will look to other countries with better funding to migrate to. In order to prevent such a brain drain, there needs to be more investment in research, not less. Countries such as China have special incentives for researchers who wish to return to their country to pursue research. India must also strive to provide a conducive environment for advanced research.

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

## Can India emerge as a major contender for aerospace manufacturing?

With global aerospace worth \$ 100 billion, the potential for the Indian aerospace industry is only expanding year on year. The numbers speak for themselves. The ninth largest civil aviation market in the world has witnessed 40 percent growth in passenger traffic in the past two years and the demand for commercial aircraft exists & is ever increasing. The industry is defined by its enthusiasm and demand for very high levels of technology, dragging project life cycles and high costs. Hence, India was following the 'perfectionist import substitution' route, where the country met its demand with partnerships with imported original equipment manufacturers (OEMs) for licensed-production of aircraft. The Make in India initiative launched by Prime Minister Narendra Modi, in September 2014 as part of a wider set of nation-building initiatives, has paved way for airframe manufacturers to increasingly use aerospace suppliers in the country. This path-breaking movement has given India great advantages on the global aerospace industry scenario. The intention is to accelerate the investments in acquisitions and infrastructure, creating a voice among the

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worldwide aerospace players. However for now, the momentum seems a little slow but steady. In October 2015, the Department Industrial Policy and Promotion (DIPP) proposed to raise the FDI cap to 74 per cent allowing to manufacture defence products by private players. This initiative aims for a certain percentage of the aircraft to be produced in India. This has encouraged a lot of Indian companies to enter into joint ventures with foreign companies to launch defence subsidiaries in the country, giving them a significant role in the industry. Although the overall industry momentum is constrained, the efforts put in the defence products manufacturing is on a steady growth path, with the new government policy. India has the highest domestic air traffic among all countries, with a significant increase of 23 per cent in January 2015, according to the International Air Transport Association's (IATA) monthly air traffic report. By 2034, IATA projects India will account for 367 million air travellers. This increases the demand in the industry, thus benefiting the aerospace manufacturers in India. India primarily has to concentrate on the improvisation of the Air Traffic Management (ATM), a ground level infrastructure modernisation, for a clutter-free growth in the industry. With the support of government policy and initiatives, the manufacturing sector has boomed, with many Indian companies becoming transnational. The sector has seen the adoption of best practices and maintains international standards in quality. India must also address the need to go beyond being merely a 'soft power' in this space, by developing more facilities that provide an end-to-end aerospace solution. This can only happen when there is cross pollination of knowledge and technologies from more advanced nations. Currently, India's share of the global aerospace industry is only \$ 250 million, but according to a joint report by IESA, Nasscom and Roland Berger, the total market opportunity for aerospace and defence (A&D) market in India will reach \$70 billion by 2029. India is the seventh largest A&D market globally but with the current scenario, one can expect a lot more from the country. The demand for aerospace manufacturers is so high that competition is more than welcome. An aircraft may easily have more than 3 million parts and it is impossible to expect one or few companies to take on the challenge. The Indian aerospace industry is closer to catapulting itself into the global arena, with the support from the government's new policies, setting the industry on to a firm path to transformational change. With a steady growth in this path, there are positive signs for the Indian aerospace industry to emerge as a major factor in the country's increasing self-reliance.

Source: <http://www.business-standard.com/>

## **Reliance Defence corners offset contracts worth ₹ 21,000 crore on Rafale deal**

Even as BEL, Bharat Dynamics Ltd, Samtel and other defence companies, are readying to get a slice of the estimated ₹ 30,000 crore Rafale offset contract, Reliance Defence has already walked away with a major chunk of the deal. The Rafale offset contract is India's biggest ever. With two joint ventures in a row related to the \$8.8-billion Rafale aircraft, Anil Ambani's Reliance Group is looking to target business worth ₹ 21,000 crore as part of the offsets. Last year, Reliance Aerostructure had entered into a 51:49 joint venture with Dassault Aviation. The new JV with Thales will help the Indian major execute Thales' offset obligation amounting to \$1 billion. The Thales JV capital is under discussion. Both Thales and Reliance Defence refused comment on the investment. Sources indicated that there were several initiatives planned between both the companies to ramp up the JV capabilities. These included identifying and qualifying for the Indian defence supply chain, as also incorporating training and development of human capital.

### **Split offset**

Both the JVs are to be located in the Special Economic Zone of Mihan, Nagpur, at Reliance Defence's upcoming greenfield facility. Last September, the Indian government signed a contract to purchase 36 Rafale fighter jets in fly-away condition. The deal incorporated 50 per cent offset clause, ensuring that 50 per cent of the deal's amount will be invested in the Indian defence ecosystem. The first of the Rafale jets from France are to be delivered by September 2019, whereas the entire lot will be delivered over the following 30 months. In order to fulfil the mandatory offsets under the deal, France is to invest 30 per cent of the total order cost in India's military aeronautics related research programmes and 20 per cent into local production of Rafale components. The offsets are to be carried out by French companies Dassault, Safran, Thales and MBDA, all part of the Rafale project. The government-to-government deal for the French twin-engine has Dassault as the prime contractor, with French multinational company Thales supplying the radar and electronics. The estimated ₹ 30,000 crore offset clause is divided among these four companies. Sources indicated that the biggest chunk would be with Dassault, with a share of ₹ 15,000 crore. While Thales has an offset obligation of ₹ 6,500 crore, Safran has an offset obligation of around ₹ 5,500 crore, and MBDA has ₹ 3,000 crore offset obligation. The Thales JV with Reliance Defence inculcates a long term strategy to serve the defence needs of the country. The JV plans to have a team of 40 people to begin with and will initially work within the framework of offsets commitments as

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part of the 36 Rafale combat aircraft contract. However, Thales also has another \$800 million to \$1 billion offset obligation against the Mirage 2000 Upgrade. Thales is yet to announce the offset partner for this.

Source: <http://www.thehindubusinessline.com/>

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