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BENGALURU SPACE EXPO 2016
1-3 SEPTEMBER, 2016



5th BENGALURU SPACE EXPO 2016

1-3 SEPTEMBER, 2016 | BIEC, Bengaluru, INDIA

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Tick tock on the clock for sole Indian team at lunar mission

Team's failure of confirmation December-end might lead to disqualification

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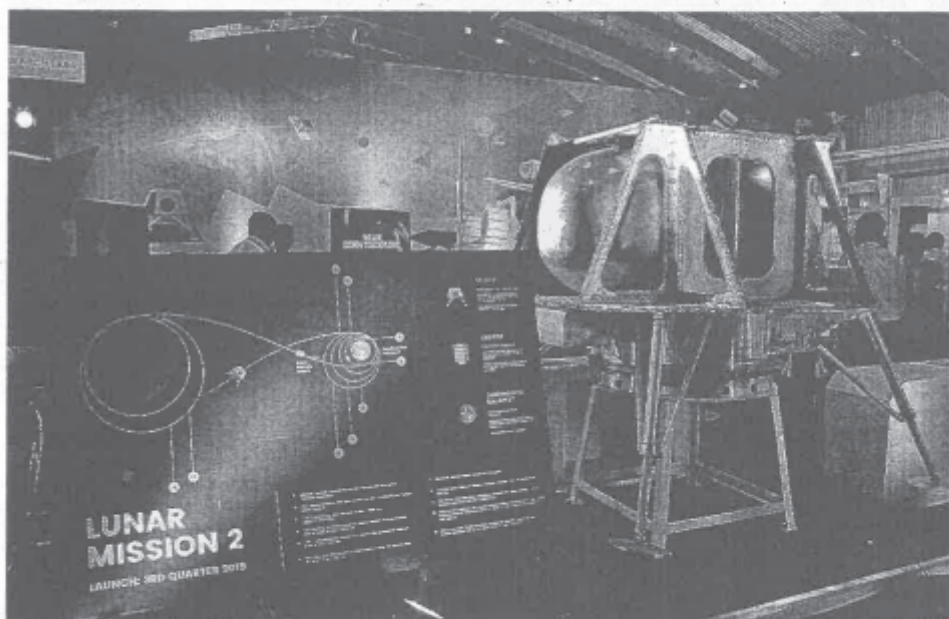
TeamIndus, the only team from India to participate in the global Google Lunar Xprize Mission challenge, could face disqualification if it fails to submit the confirmation of launch and the agency to launch its mission, by December 31, 2016 – just four months away.

The team, set up by Bengaluru-based Axiom Research Private Labs Private Limited, plans to hold talks with the Indian Space Research Organisation (ISRO) to launch its mission before December 2017. "We are not looking at any other space agency to launch our mission," Dhananjay Sharma, of TeamIndus' marketing & outreach team, informed Bangalore Mirror.

The Google Lunar Xprize Mission challenge rules stipulate that competing teams must be able to launch their mission before December 2017 and should submit launch confirmation details before December 31, 2016. However, with no confirmed launch contract yet with ISRO for an exclusive launch of TeamIndus' lander on the moon, the team – which is in the top five among 16 competing teams from the world over – could get disqualified, Dhananjay Sharma, marketing & outreach section of TeamIndus, told Bangalore Mirror.

TeamIndus has so far raised 90 per cent of the total \$70 million (about Rs 469 crore); mission, which includes \$45 million (Rs 301.5 crore) in launch cost, hopefully on-board ISRO's polar satellite launch vehicle, which launched the country's first unmanned lunar mission, Chandrayaan-1, in October 2008.

The TeamIndus' spacecraft – which is being developed as a landing spacecraft planned to land on the Mare Imbrium location on the moon – measures 1.8X2.8X2.8 metres. Sharma says the size of the spacecraft indicates that ISRO may have to set aside an exclusive launch for the TeamIndus lunar lander, with no other co-passenger satellites on board. And the launch operations on ISRO's side would more or less mirror the same sequence employed



TeamIndus lunar mission lander, a real-size of which has been presented at the Bangalore Space Expo 2016

WHAT COULD GO WRONG

- » With just four months to go for deadline, ISRO will have to rush to open a launch window sometime next year, before December
- » With plans to increase the number of launch slots, ISRO may not find an exclusive slot for a competition that is largely a private, global initiative
- » Global private and government space agencies are sore with ISRO's low-cost launch pricing. ISRO is planning to revamp its launch pricing policy; that could get in the way. TeamIndus has raised 90 per cent of funds through a network of investors and crowd-funding, so a revamp could be a big problem if the price heads upwards.
- » Focus of space agencies now is nano-satellites. Launch many in one go. ISRO/Antrix is planning one such launch to carry 68 satellites in one lift-off in early part of 2017-18 financial year, and could be a trend. The idea is to increase revenues by booking many customers rather than just one.

which launching Chandrayaan-1, which just orbited the moon, besides sending the US Moon Impact Probe crashing into the lunar surface – the exercise which subsequently helped space scientists make the breakthrough discovery of water molecules on the moon for the first time. "We have set aside \$45 million for a PSLV launch of our spacecraft," Sharma said.

The competition requires each competing team to custom build a rover from scratch, send it to the moon, make it traverse 500 metres and send pictures back to earth. The spacecraft has to endure 14 earth days (one lunar day). All the systems have to be built in-house with less than 10 per cent support from government space agencies. The first team to do it wins the \$20 million prize.

In 2014, TeamIndus won \$1 million as "landing" milestone prize from Google for demonstrating the hardware and software capabilities to support a soft-landing on the challenging lunar surface. Landing on the moon's surface is one of the toughest parts of the whole competition and

TeamIndus, along with two others, were the only ones to do it successfully. Despite the deadline for submitting the launch confirmation details looming large, TeamIndus lead, Dhruv Batra appeared confident. "We are going to make it!" he said, adding that these anxieties are normal part of the last-minute rush to meet such crucial deadlines.

TeamIndus recently launched Lab2Moon, a competition to challenge the bright young minds globally to create an experiment to fly on board the TeamIndus spacecraft to the Moon in December 2017.

The Google Lunar Xprize started in 2007 with 30 teams from across the world. Over the course of the competition 14 teams dropped off. TeamIndus has so far gone strong and is among the top five teams in contention to win the prize.

The competition rules also stipulate that a competing team cannot partner with any government space agency, but can get into a vendor-client relationship, as they are hoping to do with ISRO or its commercial arm, Antrix Corporation.

Need to work towards doubling our assets in space: Isro chief

TIMES NEWS NETWORK

Bengaluru: Indian Space Research Organisation (Isro) chairman AS Kiran Kumar on Thursday said India is "significantly short in space" and that "we need to double our assets in space and enhance other infrastructure on priority".

"Now we have a 34-satellite constellation for Earth observation, communication, navigation and space science. But we are significantly short in space. We need to at least double the number of satellites to be able to give a reasonable service to the nation," Kumar said during the fifth edition of Bengaluru Space Expo.

To double the number of satellites, Kumar said Isro must enhance launch capability and reduce satellite-building time. "We are now reaching a stage where we can launch one satellite a month, but that must be increased to at least 1.5 to 2 launches a month," he said, indicating Isro intends to launch anywhere between 18 to 24 missions every year.

"That said, we are unable to enhance the launch frequency as we don't have the supply chain required for so many launches; we have urged the private sector to participate more actively with Isro," Kiran Kumar said.

"We need to overcome this, not only to meet our demand but also because there's a huge

global market that you (private industry) can enter. The industry must have a greater share, but I know it's not easy as there are some restrictive areas. The process of change has begun and I assure you all the support," he said.

Said Rakesh S, chairman of Antrix, Isro's commercial arm, "In future, space technology will play a key role in all our lives. As of 2015, the global space market was \$330 billion and nearly 75% of that was satellites market. If the private industry is ready, there'll be a lot of opportunities."

While conceding that the industry hasn't done as well in space as in defence and aerospace, Confederation of Indian Industries (CII) Karnataka head, Ravi Raghavan, said, "This is despite Isro being one of the first government agencies to work closely with the industry."

"The world is looking at putting in place a constellation of 900 satellites just for internet services in the next couple of years. There are also other avenues like asteroid mining and so on; the potential is great

AS Kiran Kumar
CHAIRMAN,
ISRO



Will India help clear Swiss satellite debris?



OFF SPACE: A model of the spacecraft that can be used to burn satellites in orbit

TIMES NEWS NETWORK

Bengaluru: India, which has leapfrogged its way to space science advancements in the past decade-and-a-half, can become part of the world's first active space debris removal. That is, if Isro agrees to collaborate in a project vying to capture and burn a satellite that's completed its job.

The Swiss Space Centre (SSC), which launched its first satellite — SwissCube — aboard the Indian PSLV in September 2009, is back in the country with technology to capture the same in

space and burn it on its way back to ensure no debris is left behind.

SSC director Professor Volker Gass told TOI: "This'll be the first formal proposal we will make to Isro about the project. I cannot say that it has never been discussed, given the close network that space scientists share. But we've never discussed the issue formally."

SwissCube was the first Switzerland-owned satellite. The country doesn't have a space agency as such, and the SSC is part of Ecole polytechnique fédérale de Lausanne (EPFL), or the Swiss Federal Institute of Technology of Lausanne, a premier university.

With its intended work done, the satellite is now just flying around in space as debris. SSC's CleanSpaceOne is a project that has been envisaged to clear this. The Swiss delegation has met Isro which said it'll explore the idea.

The technology will see a new object launched into the same orbit as the satellite that's to be brought back, which will then be captured and burnt.

A branch of archaeology that documents space artefacts

TIMES NEWS NETWORK

Bengaluru: Today, the classic Telstar football, used in the 1970 World Cup, may have become a standard for football designs globally. But, curiously, the ball drew its design from the Telstar Communications Satellite. Deactivated in 1963, the satellite is now no more than space debris, floating unattended amid the many pieces of history.

In a room buzzing with ideas at St Joseph's College on Thursday, Alice Gorman from the department of archaeology, Flinders University, Australia, and a pioneer of space archaeology, took students on a tour



OF UNCHARTED TERRITORIES: Alice Gorman from Flinders University interacts with students at St Joseph's College on Thursday

of archaeological sites in space. "The area where man-made items are present in space extends from lower Earth orbit to the end of galaxy," she said.

Space archaeology, a specialized branch of the subject, is now exploring these

sites in space; it's a research-based study of the various man-made items found in space. What makes space archaeology different is its attempt at preserving space artefacts as cultural heritage.

"One question that we are

often asked is why do this at all? Aren't there records as it is from the recent past? But the fact is that the documented records are far from complete (because of logistical issues). Also, only these sites and items can tell how life on Earth has changed because of their presence in space," she pointed out.

While going to space to dig deep into these scientific marvels isn't a possibility, most of the work is based on research and documentation.

Though still in its early stage, space archaeology will gain prominence, especially with space tourism fast inching towards reality, said Alice.

Industry to build ISRO's two spare navigation satellites

Space agency to handhold industry for the first project and build it by March 2017

MADHUMATHI D.S.

BENGALURU: ISRO is finalising plans to get two spare navigation satellites of its IRNSS fleet built by industry in the next two years.

It will handhold industry for the first project and build it by March 2017. The second one will be built entirely by industry, M. Annadurai, Director of ISRO Satellite Centre, said on Thursday. Both will be 1,400-kg spares kept ready on ground.

"We plan to have a consortium of industry to do the two navigation satellites.



M. Annadurai, director of ISRO Satellite Centre

The rest of the seven navigation satellites are in orbit," Dr. Annadurai told *The Hindu*.

ISRO will lend its infrastructure and expertise while

industries bring on the hardware for the satellites that will back up the Indian regional navigation spacecraft, sometimes called the 'Indian GPS'.

Expressions of interest were called in June and ISRO is discussing the nitty-gritty of risks, price and profit sharing with prospective partners.

'Technical bid soon'

Dr. Annadurai said ISRO plans to go to the next level and issue the request for proposal — the technical bid — "in weeks" to interested

companies from both, public and private sectors.

The bids are planned to be evaluated and a final consortium to be identified by October, so that the spacecraft can be ready by March 2017. The second spacecraft is aimed for a year thereafter, but will be built by industry using ISRO's designs and under its watch.

ISRO Chairman A.S. Kiran Kumar said at the World Space Biz conference earlier that there was an urgency to double the number of satellites ISRO launches for a variety of uses.

Space expo



UP-CLOSE: Visitors at a stall at the three-day Bengaluru Space Expo 2016 which began in Bengaluru on Thursday.

— PHOTO: AFP

Hunting ground for new tie-ups

SPECIAL CORRESPONDENT

BENGALURU: ISRO Chairman A.S. Kiran Kumar was right on the mark when he said on Thursday that space was exciting and had no limits to what you could do in the segment.

At least three of its overseas counterpart agencies floated interesting possibilities to be pursued jointly with India, during the ongoing World Space Biz conference or BSX 2016.

Jean-Yves Le Gall, president of French space agency CNES, said he looked forward to putting a "French eye" on a moon lander and rover of Indian startup Team Indus. The city-based young company is preparing to send a 600-kg lunar craft by December 2017 as a shortlisted global Google Lunar mission contestant.

The "French eye" is a micro-camera that will capture moon's details up-close and send back.

The Swiss Space Centre, which has earlier launched a tiny satellite on the PSLV, has just discussed with ISRO the possibility of jointly sending a small spacecraft to clean space debris or dead satellites. Its director Volker Gass said space debris was the nightmare of satellite operators. The active debris cleaner satellite is planned to capture expired spacecraft and burn them in space.

Four members from the Space Industry Association of Australia — their biggest team to date — are exploring collaborations with ISRO, Indian Institute of Science and university-level exchange programmes. International Astronautical Congress 2017 will be hosted in Adelaide.

She tells stories about impact of human beings in space

CINTHYA ANAND

BENGALURU: Hers is a job title that even James Bond would envy — Alice Gorman, space archaeologist.

Dr. Gorman, a pioneer in the field, is an archaeologist who turned her eyes skyward and never looked down after that. She was in the city on Thursday as part of the Australian delegation at the Bengaluru Space Expo 2016 and delivered a talk at St. Joseph's College on the thrills of her profession.

Space archaeology is the study of human-made items in space, and the interpretation of these items to understand humankind's foray into space. Scientists such as Dr. Gorman, who work with the Department of Archaeology at Flinders University, Adelaide, Australia, use images and data from ongoing space missions to study the impact of human beings on planets and satellites.

On Chandrayaan

In an interaction with students, she spoke about how India's moon mission Chandrayaan-1 played an important role in furthering the cause of space archaeology. "Before landing, Chan-



Alice Gorman, space archaeologist

drayaan hovered over and captured images of earlier landing sites. It helped to retrace the steps of previous moon missions, and to build the story of man's mission on the moon," she said.

A popular blogger who goes by the name Dr. Space Junk, Dr. Gorman feels that space scientists interacting with the public — like NASA spacecraft Voyager 1 and Voyager 2 which together have a Twitter account handled by NASA scientists — humanises space technology. Another instance of humanising space technology is of Voyager 1 and Voyager 2 which carried phonograph records with sounds and images selected to portray the diversity of life. How readable the information will be if it is ever obtained by for-

Space scientists interacting with the public humanises space technology, says Alice Gorman

eign life remains a question. "It's funny that we hope aliens one day will be able to decipher the messages, when even children today wouldn't know what to do with a record," said Dr. Gorman.

The people who are most engaged with sharing information with the public are scientists who have worked on these projects, but they remain unrecognised, Dr. Gorman told *The Hindu*. "There is this idea of technology being cold and emotionless, and there's no space for people to have an emotion or attachment about it, but that's the stuff that makes our heritage," she said.

She feels that even inanimate objects in space have a story. "A probe records its last moments before crash landing. It's like it's filming its own death," she said. And it is her mission to preserve their story for future generations.

Six foreign satellites to be launched with Scattsat-1 this month-end

SPECIAL CORRESPONDENT

BENGALURU: Six small commercial satellites of foreign customers are slated to be launched this

month-end along with the ocean data gleaming Scattsat-1. ISRO Chairman A.S. Kiran Kumar said Algerian satellites and three others would be

launched on the PSLV.

On September 8, ISRO has lined up a GSLV launch carrying the weather satellite, INSAT-3DR.



Dr Alice Gorman, senior lecturer in Space Archaeology at Flinders University, Australia, interacts with students of St Joseph College in Bengaluru on Thursday. | PUSHKAR V

ISRO aims to launch more satellites

EXPRESS NEWS SERVICE
@ Bengaluru

CALLING for the need to enhance India's ability to build satellites, Indian Space Research Organisation (ISRO) Chairman Dr A S Kiran Kumar said the agency is trying to double its launch frequency in the coming years.

"ISRO is trying to increase the number of launches to at least one per month, and subsequently, to two per month. 'We still have a long way to go,' he said.

Delivering the keynote address at the fifth edition of Bengaluru Space Expo (BSX), he said the launch frequency cannot be increased right now as supply of satellites is inadequate.

The process of satellite building and integration has to be enhanced, he said.

This will provide the Indian industry an

opportunity to capture a share in the multi-billion dollar global market, he added.

Deep space

There are many opportunities in deep space, such as asteroid mining and other opportunities. Deep space is the void between celestial bodies. "We are significantly short of capacity in space. The number of satellites should be doubled (for us) to be of service to the country," he said.

Deep Kapuria, Chairman of Confederation of Indian Industry (CII) MSME Council said CII will form a group to develop space technology.

BSX is being held till September 3 at Bangalore International Exhibition Centre. According to the organisers, representatives of 12 nations are participating in the international conference on space business.

Swiss plan Swacch Space Mission

AKRAM MOHAMMED
@ Bengaluru

A model from the Swiss Space Centre exhibited at Bengaluru Space Expo shows what the project aims to achieve in Space what India is trying to achieve on the ground: Cleanliness.

As surprising as it sounds, the objective of 'CleanSpace One' is to remove orbital debris, that have caused losses in millions of dollars for the space industry.

According to Volker Gass, Director of Swiss Space Centre, though there were several international guidelines to deorbit defunct satellites or spacecrafts, there has been no strict regulation. Considering the losses suffered due to space debris, it is essential to develop tools to remove them, he said.

CleanSpace One is expected to be launched in 2018-19, and will attempt to deorbit SwissCube, which was launched in 2007. The ambitious project, will be a precursor to the Active Debris Removal programme. The objective, Gass said, was to ensure environmental ethics, both on earth and space.

Collaboration

Gass said the Swiss Space Centre is looking for a collaboration between industry and academia. "We met the ISRO chairman two days ago and an agreement between the two is being prepared," he said. Talks are still in their initial stages. "We have shared a good relationship in the past, as we have used PSLV launcher twice," he added.

Telescope array

William E Barrett, senior VP of Asia Pacific Aerospace Consultants Ltd, who was part of the Australian delegation, said they were looking at industry level collaboration. Apart from exploring options to use ISRO's launch vehicles, Australia was also looking at options for a large radio telescope array.

Indian Express



■ பெங்களூரு சர்வதேச கண்காட்சி மையத்தில், ஐந்தாம் ஆண்டு பெங்களூரு விண்வெளி வர்த்தகம் மற்றும் கண்காட்சியை துவக்கி வைத்து பார்வையிட்ட, இஸ்ரோ தலைவர் கிரண் குமார்.

अंतरिक्ष में क्षमता के मामले में देश अब भी काफी पीछे

मांग के अनुपात में सिर्फ 50% उपग्रह ही उपलब्ध

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बैंगलूरु, चांद और मंगल पर पहुंचने के बावजूद भारत उपग्रह आधारित सेवाओं को लेकर पूरी तरह आत्मनिर्भर नहीं हो पाया है। देश के पास अभी तीन श्रेणियों में 34 सक्रिय उपग्रह हैं जो घरेलू मांग के अनुपात में सिर्फ 50 प्रतिशत की ही पूर्ण करते हैं।

भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) के अध्यक्ष ए एस किरण कुमार ने गुरुवार को मुम्बई के रॉड स्थित बैंगलूरु अंतरराष्ट्रीय प्रदर्शनी केंद्र में तीन दिवसीय पांचवें बैंगलूरु स्पेस-एक्सपो-2016 के उद्घाटन करते के बाद पत्रकारों से बातचीत में यह बात कही।

बेहतर सेवा के लिए बढ़ानी पड़ेगी क्षमता

उन्होंने कहा कि इसरो के पास संचार, नौवहन और पृथ्वी निगरानी के लिए उपग्रह हैं जो मछली पकड़ने वाले क्षेत्रों की स्थिति से लेकर फसल पैदावार के पूर्वानुमान के अलावा किसी व्यक्ति या वस्तु को खोजने में मदद करते हैं। सरकारी विभाग भी इसरो के उपग्रह आधारित सेवाओं का उपयोग कर रहे हैं। हालांकि, अंतरिक्ष तकनीक में हमारी क्षमता अपेक्षा से कम है। देश को बेहतर सेवा देने के लिए हमें मौजूदा उपग्रहों की संख्या कम से कम दुगुनी करनी पड़ेगी।

निजी क्षेत्र की

भागीदारी की दरकार

कुमार ने कहा कि उपग्रह निर्माण और प्रक्षेपण की रफ्तार बढ़ाने के



लिए अंतरिक्ष क्षेत्र में निजी उद्यमों की भागीदारी बढ़ाना समय की मांग है।

उन्होंने कहा कि निजी क्षेत्र अभी उपग्रह और प्रक्षेपण यान के लिए सरचनात्मक ढांचा और कई उपकरण उपलब्ध कराता है लेकिन प्रक्षेपणों की संख्या बढ़ाने के लिए सिर्फ यही पर्याप्त नहीं है। इसरो इसके लिए 'नई संभावनाएं' तलाश रहा है। इसरो की वॉल्यूमेट्रिक इकाई एंटीक्स कॉर्पोरेशन उद्योगों को अंतरिक्ष उद्योग से जोड़ने की कोशिश कर रहा है। उन्होंने कहा कि हम उद्योग जगत को अंतरिक्ष तकनीक क्षेत्र में मौजूद विपुल संभावनाओं के बारे में अवगत कराने और इस क्षेत्र में निवेश करने के लिए प्रोत्साहित करने का प्रयास कर रहे हैं।

निजी कंपनियों से मिला सकासत्मक उत्तर

कुमार ने कहा कि इसरो ने हाल ही में निजी क्षेत्र से उपग्रह व प्रक्षेपण यान निर्माण क्षेत्र में भागीदारी के लिए औद्योगिक पत्र मांगा था, जिसे निजी कंपनियों से काफी सकारात्मक प्रत्युत्तर मिला। 40

कंपनियों ने उपग्रह निर्माण में भागीदारी की इच्छा जताई है तो 60 कंपनियों ने प्रक्षेपण यान के निर्माण में साझेदारी की इच्छा व्यक्त की है। प्रक्षेपण आवृत्ति बढ़ाने पर बल देते हुए इसरो प्रमुख ने कहा कि हमने शुरूआत तो कर दी है लेकिन अभी बहुत लंबा सफर तय करना है। उन्होंने निजी क्षेत्र को अंतरिक्ष तकनीक से नहीं जोड़े जाने की बात को स्वीकारते हुए कहा कि अब इस स्थिति को बदलने की कोशिश की जा रही है। उन्होंने कहा कि मौजूदा आपूर्ति श्रृंखला पर्याप्त नहीं होने के कारण हम प्रक्षेपणों की संख्या बढ़ाने में सक्षम नहीं हैं। अब हम इस स्थिति में आ चुके हैं कि हर महीने एक उपग्रह का प्रक्षेपण कर सकते हैं, लेकिन हमें देश की जरूरतों को पूरा करने के लिए इसे बढ़ा कर डेढ़ या दो उपग्रह प्रति महीने करने की जरूरत है ताकि साल में कम से कम 18 उपग्रहों का प्रक्षेपण किया जा सके। उन्होंने कहा कि इसरो अपने सफर में 138 मिशन को अंजाम दे चुका है। इसरो ने विभिन्न देशों के 74 उपग्रहों का भी प्रक्षेपण अपने पीएसःसलवी रॉकेट से किया है।

सरकारी विभागों में बढ़ा उपयोग

कुमार ने कहा कि बेहतर संचार उपलब्ध करने के लिए सरकारी विभागों में भी अंतरिक्ष तकनीक आधारित सुविधाओं का उपयोग बढ़ा है। उन्होंने कहा कि पाहें स्वास्थ्य, कृषि शिक्षा, अप्रवा प्रबंधन और खरों विकास कार्यक्रमों को भी लागू करने के लिए केंद्र और राज्य सरकारें इसरो की तकनीक और सुविधाओं का उपयोग कर रही हैं। उन्होंने कहा कि केंद्र सरकार के 80 विभाग और सभी राज्य सरकारें अपनी योजनाओं के क्रियान्वयन और उनकी निगरानी के इसरो के उपग्रह सेवाओं की मदद ले रही हैं। उन्होंने कहा कि दो-तीन घंटे तक तक स्थिति ऐसी नहीं थी। केंद्र सरकार के 15 विभाग और कुछ राज्य सरकारें ही इसरो की तकनीक का उपयोग करते थे। अब तेजी से स्थिति बदल रही है।

Isro chief says demand for services multiplying

ALNOOR PEEROMAHMED
Bengaluru, 1 September

Central and state government departments are increasingly turning to the Indian Space Research Organisation (Isro) for technologies and solutions, says the latter's head.

Around 60 central government departments and all states work with us to improve planning, monitoring and other activities through the 34 satellites of various functions the country has in space, said Isro chief A S Kiran Kumar.

"They are realising that space technology and space-based tools have a very significant role in delivering of good and efficient governance. We are seeing a spurt of activities

at the government level, demanding greater and greater services to be provided by Isro," he said while inaugurating Space Expo 2016 here on Wednesday.

From working with 15-odd central government departments and a few states for the first three decades, the sudden demand for space-based tools and solutions is pushing Isro to expand its operations significantly, he explained.

The agency was now looking at making one launch every month, to inject more satellites into space.

"We're still significantly short of capacity in space. We probably need double the number of satellites of what



"WE ARE SEEING A SPURT OF ACTIVITIES AT THE GOVERNMENT LEVEL, DEMANDING GREATER AND GREATER SERVICES TO BE PROVIDED BY ISRO"

"WE'RE STILL SIGNIFICANTLY SHORT OF CAPACITY IN SPACE. WE PROBABLY NEED DOUBLE THE NUMBER OF SATELLITES OF WHAT WE HAVE TODAY, TO GIVE A REASONABLE LEVEL OF SERVICE TO THE COUNTRY"

A S KIRAN KUMAR, Indian Space Research Organisation chief

we have today, to give a reasonable level of service to the country. This means we have to enhance our ability to launch satellites and build these at a much faster pace," added Kiran Kumar.

He said they were, in this regard, aiming to increase the private sector's participation in India's space story.

"We have started the process and I assure you that we will do everything to make

sure that we enable the industry in our country to not only contribute to our activities — we're also very interested in making sure that this industry can capture a part of the global market," said the Isro chief.

Business Standard | 2 September 2016

Antrix gearing to launch 68 small satellites in early 2017

OUR BUREAU

Bengaluru, August 31

Antrix, the commercial arm of Indian Space Research Organisation (ISRO), is planning to send into orbit 68 small satellites from countries across the world early next year.

"These 68 small satellites will be riding on our workhorse Polar Satellite Launch Vehicle (PSLV) in the next six months," said S Rakesh, chairman and managing director of Antrix, while announcing the 5th edition of Bengaluru Space Expo (BSX-2016).

"Antrix has been attracting

the world's attention for low-cost and flawless launch capabilities of satellites," he added.

Space Expo

BSX-2016, which is planned in collaboration with CII from September 1 to 3, is expected to provide an opportunity for networking with global operators and suppliers in space industry.

Rakesh said ISRO had created a record with its 16th flight of PSLV-C34 in July this year, when it successfully launched the 127.5 kg Cartosat-2 series satellite along with 38 co-passenger satel-



S Rakesh, Chairman & Managing Director, Antrix

lites from its spaceport in Sriharikota. It was the 15th consecutive successful mission

of PSLV. The total weight of all the 39 satellites carried onboard PSLV-C34 was 1,288 kg.

"PSLV is very commercially competitive and it is the reason it has attracted interest among many countries and organisations which wanted their own satellites in the space," he added.

Govt subsidy

The commercial arm of ISRO had already earned good sum in foreign exchange through these launches of foreign satellites.

In a question over the US

Congress' reservations over Indian space programmes and Antrix inviting commercial flights being heavily subsidised, Rakesh said Antrix is not bothered.

"Every Indian space programme is subsidised by the government. It is not that US space launches or those from other (space-faring) countries are not subsidised (by those governments)."

"We need not answer all those questions. We are doing our programmes and competing with the world. We will try to be more competitive and that will provide the answer," he added.

Guess who is cracking black hole code? India's very own ISRO!

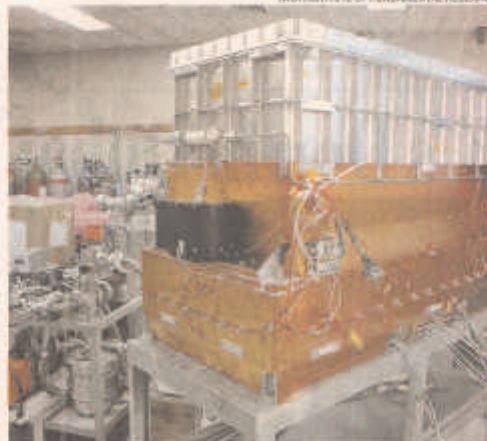
Mihika Dasu
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TWEETS @mihikabMirror

India's first dedicated satellite, Astrosat, which was launched by the Indian Space Research Organisation (ISRO), has, for the first time, observed "rapid variability of high-energy X-ray emission" from a black hole system. Further analysis of the data will provide "unprecedented insight" into the temporal behaviour of black hole systems, said the research team from multiple institutions in Bengaluru, Mumbai and Pune.

"After careful performance verification of the instruments on board Astrosat, Indian scientists are now using Astrosat to unravel the mysteries of the Universe and this finding is just the beginning of a large number of such discoveries that Astrosat is expected to make.

This marks a new era for Indian astronomy with Astrosat being a front-line dedicated astronomy satellite," said the researchers from the department of astronomy & astrophysics, Raman Research Institute, Bengaluru; Tata Institute of Fundamental Research (TIFR), Mumbai; and Inter-University Centre for Astronomy and Astrophysics, Pune, among others. The



The large area X-ray proportional counter (LAXPC) flight spare at TIFR, Mumbai. The latest observations have been made by LAXPC instrument, on board the space mission, Astrosat

NO OTHER OBSERVATORY CAPABLE OF ACHIEVING SUCH RESULTS

Astrosat, which was successfully launched on September 25, 2015, has five scientific instruments on board, including LAXPC. With a mass of 414 kg and an area of 8,000 cm square - three units of LAXPC - was fabricated by TIFR Prof JS Yadav. No payload of this area has been flown so far and hence it was a big challenge for the country when it was first mooted, said scientists. The instrument also measured the arrival

time difference between the high- and low-energy X-rays, which is of the order of tens of milliseconds, providing direct clues to the geometry and dynamic behaviour of the gas swirling round a spinning black hole. "All this information was obtained by just nine orbits or a few hours of Astrosat observation of the source. No other observatory is capable of achieving these results," said the authors.

findings have been published in 'Astrophysical Journal'.

In black hole systems, mass from a regular star gets stripped off and falls towards the black hole forming a disk around the black hole. The temperature of the disk is more than ten million degrees and hence the system emits X-rays. The total power coming out of these systems is often more than ten thousand times that of the sun. Yet these systems vary rapidly in time-scales much less than a second.

Astronomers have always been puzzled by the enigmatic black hole system called GRS 1915+105. It shows many different kinds of behaviours and its X-ray emission sometimes oscillates nearly on a time-scale of a few hundred milliseconds.

While these oscillations have been known and studied earlier in low-energy X-rays using the American satellite Rossi X-ray timing experiment, they have now been detected and characterised in high-energy X-rays by the large area X-ray proportional counter (LAXPC) instrument on board the space mission, Astrosat. The LAXPC instrument, which is the only instrument world-wide capable of such study, was designed and developed indigenously at TIFR.

ISRO ready to strap on private sector for launch power

India needs more satellites in space, better tech for reasonable service, says Kiran Kumar

OUR BUREAU

Bengaluru, September 1

The Indian Space Research Organisation (ISRO) is making efforts to rope in the private sector to emerge as a major force in small satellite launches.

Addressing the 5th edition of Bangalore Space Expo, 2016, organised by Antrix (ISRO's commercial arm) and CII, AS Kiran Kumar, ISRO Chairman, said: "We have made headway in vehicle launch programme which has enabled the country to emerge as a major force in

global space sector. After launch of 22 satellites a couple of months ago, there has been overwhelming response for the recent Request of Interest (RoI) floated by ISRO to partner with the private sector, with more than 40 companies submitting their bids to participate in building satellites," he added.

New tech needed

According to Kumar, the prime focus of the Bangalore Space Expo is to involve the private sector in helping the country bring in new technology.

"ISRO is playing a catalyst role to help hand-hold the private sector. For this, a major role in indigenisation of the space sector is needed. We have already taken them in satellite integration," he explained.

Talking about ISRO's capabilities, the Chairman said: "We



Jet set go! According to ISRO, launch frequency could not be improved earlier because of the lack of a supply chain in PLASMA

have almost reached a state where we can launch one satellite every month and it should be enhanced to 15 or 2 satellites per month, so we are looking at 24 launches per year, or at least 18." He said that the launch frequency could not be improved earlier because of the

lack of a supply chain. This gap should be overcome not just to meet the gap of ISRO's demand, but also allow the private sector to enter global space technology market, he added.

"The Industry must have a greater share, but it is not there because there are some restrict-

The ISRO Chairman said the Indian industry should be proactive to cash in on Geospatial and Big data analytics, which are the next big things in the field of technology

ive areas that need to be addressed urgently. The process has already begun and I assure (the industry) that we will work things out," he further added.

The ISRO Chairman said on Thursday that the world is exploring the idea of building 900 satellites for Internet in the next five years, and the Indian industry should be proactive to cash in on Geospatial and Big data analytics, which are the next big things in technology.

Satellite requirement

The need for India is to have more satellites in space to provide reasonable service to the country.

"We have a constellation of 34 satellites on earth observation, communication, navigation, and other space sciences at the moment. But this is significantly short, and we need to at least double the number of satellites to give reasonable service to the country. Launch ca-

pability must be enhanced, and satellite building must be made faster to get optimal use of space services," he added.

He said the Centre and State governments were now realising the need for space technology. The first 35 years of development of space technology in the country had witnessed only 20 central government departments use the technology. But now, over 60 central government departments and all State governments were working with ISRO to utilise the country's space technology capability.

ISRO's next launch

He added that ISRO has lined up launch of INSAT-3DR on September 8, using heavy-weight GSLV MkII, and on September 26 it will launch four satellites - including ScanSat of the ISRO, and an Algerian satellite, besides two mini satellites from the Universities.

ಬಾಹ್ಯಾಕಾಶ ತ್ಯಾಜ್ಯ ವಿಲೇಗೆ ಯೋಜನೆ ಸ್ವಿಸ್ ಕಂಪನಿಯಿಂದ ಅನಾವರಣ » ಬೆಂಗಳೂರು ಸ್ಪೇಸ್ ಎಕ್ಸ್‌ಪೋಗೆ ಚಾಲನೆ

■ ವಿಜಯವಾಡೆ ಸುದ್ದಿಜಾಲ ಬೆಂಗಳೂರು

ಇಂಡೀ ಖಾಸಗಿ ಭಾರತೀಯ ಕೈಗಾರಿಕಾ ಸಂಸ್ಥೆಗಳ ಒಕ್ಕೂಟ (ಸಿಐಐ) ಜಂಟಿಯಾಗಿ ಬೆಂಗಳೂರು ಅಂತಾರಾಷ್ಟ್ರೀಯ ಪ್ರದರ್ಶನ ಕೇಂದ್ರದಲ್ಲಿ ಆಯೋಜಿಸಿರುವ 3 ದಿನಗಳ 5ನೇ ಬೆಂಗಳೂರು ಬಾಹ್ಯಾಕಾಶ ಎಕ್ಸ್‌ಪೋಗೆ ಗುರುವಾರ ಚಾಲನೆ ದೊರಕಿದೆ. ಬಾಹ್ಯಾಕಾಶ ತಂತ್ರಜ್ಞಾನ ಉತ್ಸಾಹದ ವಲಯದ ಖಾಸಗಿ ಸಂಪರ್ಕ ಹೊಂದಿರುವ ವೇಶ್-ಮಿಡೇಲ್‌ಗಳ 25ಕ್ಕೂ ಹೆಚ್ಚು ಕಂಪನಿಗಳು ಮೇಲೆದ್ದು ಭಾಗವಹಿಸಿದ್ದು,

ಮೂರು ದಿನ ನಡೆಯಲಿರುವ ಮೇಲೆ ವಿಜಯವಾಡೆ ಸುದ್ದಿಜಾಲ ಬೆಂಗಳೂರು

ವಿಜಯವಾಡೆ ಸುದ್ದಿಜಾಲ ಬೆಂಗಳೂರು

ವಿಜಯವಾಡೆ ಸುದ್ದಿಜಾಲ ಬೆಂಗಳೂರು

ವಿಜಯವಾಡೆ ಸುದ್ದಿಜಾಲ ಬೆಂಗಳೂರು



ಬೆಂಗಳೂರು ಅಂತಾರಾಷ್ಟ್ರೀಯ ಪ್ರದರ್ಶನ ಕೇಂದ್ರದಲ್ಲಿ ಆಯೋಜಿಸಲಾಗಿರುವ ಸ್ಪೇಸ್ ಎಕ್ಸ್‌ಪೋ ವೀಕ್ಷಿಸುತ್ತಿರುವ ಇನ್ನೋ ಅಧ್ಯಕ್ಷರಾದ ಎ.ಎಸ್. ಕಿರಣ್ ಕುಮಾರ್.

ಐಐಎಸ್‌ಸಿಯಿಂದ ವೈರ್‌ಲೆಸ್ ಇಂಟರ್‌ನೆಟ್ ಸಂಪರ್ಕ

ಗೋಲ್ಡ್, ಫೇಜ್‌ಬುಕ್ ಸೇರಿ ಬೃಹತ್ ಕಂಪನಿಗಳು ವಿಶ್ವದಾದ್ಯಂತ ಇಂಟರ್‌ನೆಟ್ ಸೇವೆ ಒದಗಿಸಲು ಮುಂದಾಗಿರುವ ಮಧ್ಯಯುಗ, ಇಂಡಿಯನ್ ಇನ್‌ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಸ್ಪೇಸ್ (ಐಐಎಸ್‌ಸಿ) ವೈರ್‌ಲೆಸ್ ಇಂಟರ್‌ನೆಟ್ ಸೇವೆ ನೀಡಲು ಯೋಜನೆ ರೂಪಿಸುತ್ತಿದೆ. ಹದ್ದು ಹಿಡಿದು ಮೂರನೆಯ ಬಾರಿಗೆ ಉಪಗ್ರಹ ಆಧಾರಿತ ವೈರ್‌ಲೆಸ್ ಇಂಟರ್‌ನೆಟ್ ಸೇವೆ ಮೊದಲಾಯಿತು. ಈ ಯೋಜನೆ 2020ರ ವೇಳೆಗೆ ಕಾರ್ಯರೂಪಕ್ಕೆ ಬರಲಿದೆ ಎಂದು ಐಐಎಸ್‌ಸಿ ಹಳೇ ವಿದ್ಯಾರ್ಥಿಗಳು ರೂಪಿಸಿರುವ ಅನ್ವೇಷಣಾ ಕಂಪನಿಯು ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ಅಧಿಕಾರಿ ಎಚ್.ಎಲ್.ಪ್ರಸಾದ್ ಘಟಕ ತಿಳಿಸಿದ್ದಾರೆ.

ಎಕ್ಸ್‌ಪೋ ಉತ್ಸವವಾಗಿ ಆಯೋಜನೆ ಮಾಡಲಾಗಿದೆ. ನಾವು ವಿಜ್ಞಾನ ಮತ್ತು ಕೈಗಾರಿಕೆ ಹೆಂಡದಲ್ಲಿ ಒಬ್ಬನಿಂದ ಮಾಡಿಕೊಳ್ಳಬೇಕೆಂದು ಕೊಂಡಿದ್ದೇವೆ.

! ವಿಜಯಂ ಇ ವಾಡೆ! ಎಕ್ಸ್‌ಪೋ ಫೆಸ್ಟಿವಲ್ ಎಯೋಸ್ಪೇಸ್ ಕೆಪ್ಪೆಲ್ಲೆನ್ನಿ ಹಿರಿಯ ಉಪಾಧ್ಯಕ್ಷ

ಹೊಸ ಕಂಪನಿಗಳನ್ನು ಪ್ರಾವೀಣ್ಯ ಮುಂದೆ ಬರುವವರಿಗೆ ಕಾಂಕ್ಷಿತ ಸಹಾಯ ಮಾಡಲು ಖಾಸಗಿ ಮೂಲದಿಂದ ಒದಗಿಸಿಕೊಡುವುದು ನಮ್ಮ ಕಂಪನಿಯ ಉದ್ದೇಶವಾಗಿದೆ.

! ವಿ. ಆರ್. ಕುಮಾರ್ ವಿಸ್ತಾರ ಕಂಪನಿ ಹಿರಿಯ ಮ್ಯಾನೇಜರ್

Industry-govt tie-up key for space sector growth: Isro chief

Agency to focus on capacity building to up satellite launches



A model of a lunar vehicle displayed at the Bangalore International Exhibition Centre on the inaugural day of the fifth edition of the three-day Bengaluru Space Expo 2016 on Thursday. CH PHOTO

BENGALURU: The Indian Space Research Organisation (Isro) wants to jack up its launch capabilities in the coming years. There, however, are a number of impediments to this plan, said the agency's chairman, A S Kiran Kumar.

Speaking at the World Space Biz 2016, the international conference on space business, Kumar said the agency already had a capability of nearly one launch per month. "We want to increase our launch frequency by at least one-and-a-half to two times. We are, however, not able to do this because of an inadequate supply chain," he said. Although Isro has to its credit 74 satellite launches of various countries and 34 of its own

satellites, there is a need to double this figure, said Kumar. "We are short of capacity and need to build capabilities to launch more frequently to give reasonable service," he said.

Explaining the different areas where space technology is being used and its potential for growth, he highlighted its uses in geospatial mapping, earth imaging and observation. "From 15 to 20 central government departments that used the technology three-and-a-half years ago, now 50 central departments and all state governments use it."

He said deep space research, asteroids and planet mining are other areas where space technology will grow.

To achieve all these aims and for growth in the sector, Kumar

said industry-government collaboration was "crucial".

Ravi Raghavan, chairman Confederation of Indian Industry (CII), Karnataka Council, called upon the private sector to enter the space industry. "Space is one area that has not been exploited by the private sector. It has enormous potential," he said.

Rakesh S, chairman, Amrith Corporation Limited, the commercial arm of Isro, said space technology was set to play an important role in people's lives. "Of the total growth in space tech, 75% is in the area of satellites. There is a booming area of small-scale satellites with 2,000 to 25,000 satellites to be launched soon across the globe," he said.

DH News Service

Vijayavani, Namasthe Bengaluru | 2 September 2016

अंतरिक्ष में क्षमता के मामले में अभी पीछे है भारत : इसरो प्रमुख

बैंगलूरु। इसरो के अध्यक्ष एस किरण कुमार ने गुरुवार को कहा कि अंतरिक्ष में देश की क्षमता उल्लेखनीय रूप से कम है और उपग्रहों की संख्या दोगुनी करने की जरूरत है। कुमार ने कहा, हम अब भी अंतरिक्ष में क्षमता के मामले में उल्लेखनीय रूप से पीछे हैं। हमें शायद उपग्रहों की संख्या अपने पास आज मौजूद उपग्रहों से कम से कम दोगुनी करने की जरूरत है ताकि देश को यथोचित सेवा दे सकें।

कुमार ने यहां बैंगलूरु स्पेस एक्सपो-2016 (बीएसएक्स-2016) का उद्घाटन करने के बाद कहा कि इसका यह भी मतलब है कि देश को आज के समय से बहुत अधिक रफ्तार से उपग्रह प्रक्षेपण करने की और उनका निर्माण करने की क्षमता बढ़ाने की जरूरत है। उन्होंने कहा कि आज इसरो एक महीने में एक प्रक्षेपण पूरा करने की क्षमता रखता है। अगर हमें देश को, उसकी सरकार को और निगरानी की जरूरतों को प्रभावी समाधान मुहैया कराने हैं तो निकट भविष्य में इस क्षमता



को डेक से दोगुना तक बढ़ाना होगा। कुमार ने कहा, हमने शुरुआत कर दी है, लेकिन हमें अब भी बड़ी दूरी तय करनी है। आज हम अपनी प्रक्षेपण आवृत्ति बढ़ाने में सक्षम नहीं हैं क्योंकि आज जो आपूर्ति श्रृंखला मौजूद है वह हमारी मांग पूरी करने के लिहाज से अपर्याप्त है। इसरो की आज तक की

यात्रा को याद करते हुए उन्होंने कहा कि करीब 138 मिशन पूरे हो चुके हैं और अंतरराष्ट्रीय समुदाय के 74 उपग्रहों को भारत के प्रमुख उपग्रहों के साथ छोड़ा जा रहा है। इसरो प्रमुख ने कहा कि यह सुनिश्चित करना होगा कि जो क्षमताएं विकसित की जा रही हैं, उन्हें वास्तव में व्यावहारिक घरातल पर उतारा जाए।

Dakshin Bharat | 2 September 2016



ಅಂಕಾರಾಧ್ಯಾಯ ವಸ್ತುಪ್ರದರ್ಶನ ಕೇಂದ್ರದಲ್ಲಿ ಆರಂಭವಾದ 'ಬೆಂಗಳೂರು ಸ್ಪೇಸ್ ಎಕ್ಸ್‌ಪೋ-2016' ವಸ್ತು ಇನ್ನೂ ಅದ್ಭುತ ದಾ. ಕೆರಣ್ ಕುಮಾರ್ ನಿರ್ಮಿಸಿದರು.

Udayavani | 2 September 2016

सितंबर में दो उपग्रहों का प्रक्षेपण करेगा इसरो

बैंगलूरु हर महीने एक उपग्रह के प्रक्षेपण का मिशन कर चुका भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) इस महीने सितंबर में दो उपग्रहों का प्रक्षेपण करेगा। शुरुवात को आरंभ हुए 'बैंगलूरु स्पेस एक्सपो-2016' का अगलोकान करने के बाद इसरो के अध्यक्ष एएस किरण कुमार ने संवाददाताओं को बताया कि इनसेट-3 डीआर को आठ सितंबर को छोड़ा जाएगा जबकि सितंबर माह के अंत में स्केटसेट के साथ अन्तरिक्षाई उपग्रह का भी प्रक्षेपण किया जाएगा। इससे पहले जियोस्टेशनरी बीसम उपग्रह इनसेट-3 डीआर का प्रक्षेपण जीएसएलवी मार्क दो के साथ होना था जो तकनीकी दिक्कतों के चलते स्थगित कर दिया गया था।

पहले इसका प्रक्षेपण 28 अगस्त को होना था। स्केटसेट चरलू सार पर विकसित बीसम का हात बताने वाला उपग्रह है। यह समुद्री हवाओं की निगरानी रख सकता है और तूफान का अनुमान लगा सकता है। किरण कुमार ने कहा कि इसरो की योजना है कि वर्ष में 24 उपग्रहों का प्रक्षेपण किया जाए या फिर फिलहाल हम 18 उपग्रह का तो प्रक्षेपण जरूर करें। उन्होंने कहा कि इसके लिए शुक्रांती योजना के तहत हम प्रत्येक महीने एक प्रक्षेपण का लक्ष्य लेकर चल रहे हैं।

एक ही मिशन में 68 उपग्रहों के प्रक्षेपण की योजना

भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) अगले साल के आरंभ में एक ही मिशन में रिकार्ड 68 उपग्रहों के प्रक्षेपण की योजना बना रहा है। एंटिक्स सीएमडी राकेट शक्तिभूषण ने कहा, प्रक्षेपण तो कई होने हैं लेकिन यह एक खास प्रक्षेपण है जिसमें हम करीब 68 उपग्रहों को भेजने की योजना बना रहे हैं। अपनी किरण का यह एक खास प्रक्षेपण होगा क्योंकि इसरो



बैंगलूरु में शुरुवात को बैंगलूरु स्पेस एक्सपो-2016 का उद्घाटन इसरो प्रमुख डॉ. एएस किरण कुमार ने किया।

ने अब तक एक साथ 68 उपग्रहों को प्रक्षेपित नहीं किया है। उन्होंने कहा कि यह भी एक प्रक्षेपण है जो मेहद खान और रिकार्ड की दृष्टि से ऐतिहासिक होगा और अभी इसे अंतिम रूप दिया जाना है। एंटिक्स इसरो की वाणिज्यिक इकाई है। अधिकारियों के मुताबिक यदि सब कुछ ठीक रहा तो अगले छह सात महीने में यह प्रक्षेपण हो सकता है और उपग्रह दूसरे देशों के नेते उपग्रह होंगे। गौरवजन्य है कि अपने अंतरिक्ष कार्यक्रम में एक रिकार्ड बनते हुए इसरो ने जून में एक मिशन में 20 उपग्रहों को प्रक्षेपित किया था।

इसरो अगले छह महीने में अपने सबसे विश्वसनीय भूवीय उपग्रह प्रक्षेपण यान पीएसएलवी से इस अभियान को अंजाम देना। इससे पहले पिछले 22 जून को पीएसएलवी सी-34 ने एक साथ 20 उपग्रहों का प्रक्षेपण कर पूरी दुनिया को चौंकया था। उन्होंने कहा कि पीएसएलवी विध के अन्य अंतरिक्ष शक्ति संपन्न देशों को वाणिज्यिक तौर पर कड़ी प्रतिस्पर्धा दे रहा है। उन्होंने कहा कि विश्व के

कई देश अपने उपग्रहों के प्रक्षेपण के लिए इसरो के पास आ रहे हैं। इसरो निदेशक (जनसंपर्क) देवी प्रसाद कार्णिक ने कहा कि इसके लिए उन राष्ट्रों को अंतरराष्ट्रीय मंजूरी हासिल करनी होगी, जो इसरो के सहयोग से अपने उपग्रह अंतरिक्ष में स्थापित करना चाहते हैं। इसरो अपनी ओर से एक साथ 68 उपग्रहों को पृथ्वी की कक्षा में स्थापित करने को तैयार है।

इसरो का यह महत्वाकांक्षी प्रक्षेपण कई मायनों में खास होगा क्योंकि मौजूदा समय में इस प्रकार के प्रक्षेपण की बुकिंग अमेरिका और रूस जैसे देशों के ही पास है। हालांकि अमेरिका, रूस, चीन जैसी देशों की तुलना में इसरो का प्रक्षेपण कार्यक्रम काफी सरल और भरतसमंद रहता है। इसी कारण दुनिया के कई देशों ने इसरो पर भरोसा दिया। इसरो के अनुसार प्रस्तावित 68 उपग्रहों के प्रक्षेपण में भारत के साथ ही दुनिया के कई अन्य देशों के उपग्रह भी शामिल होंगे। हालांकि अभी तक यह तय नहीं हुआ है कि ये उपग्रह कौन से होंगे और प्रक्षेपण की निश्चित तारीख क्या होगी।

Dakshin Bharat | 2 September 2016

விண்வெளி ஆய்வு கண்காட்சி



பெங்களூருவில் நேற்று நடந்த விண்வெளி ஆய்வு கண்காட்சியை இஸ்ரோ தலைவர் திரு.கே. குமார் தொடங்கி வைத்தார்.

Dinakaran | 2 September 2016

Antrix hits payload dirt in global small satellite surge

RAGHU KRISHNAN
Bengaluru, 30 August

Antrix Corporation, the commercial arm of Indian Space Research Organisation (Isro), has orders to launch 68 satellites - the largest so far - as global small satellite makers scramble to hurl them on India's workhorse polar satellite launch vehicle (PSLV) rocket.

The orders include contracts from U weather forecasting satellite company, PlanetIQ, which has signed a deal to launch 12 satellites on India's PSLV by 2017 and a heavier earth observation satellite by an unnamed customer.

India's space agency is positioning PSLV as a reliable rocket to hurl small satellites, at a time there is a global shortage of rockets and a surge in global satellite makers planning to hurl hundreds of small satellites.

Antrix estimates over 2,500 satellites to be built over the next few years, as start-ups and global firms look at using satellites as small as one kilo for navigation, maritime and surveillance. The biggest is that of OneWeb, a global consortium that includes Virgin Group, Bharti Enterprises and Qualcomm, aiming to hurl 648 small satellites and form a constellation and beam high-speed internet to local terminals. Bharti has committed it would work with Isro to launch several of these satellites.

Isro, so far, has launched 74 satellites for foreign customers, including the US, Israel, Singapore and Britain.

India will witness increased competition for launch business from players such as SpaceX, Blue Origin, Rocket Lab and Firefly Systems, who will begin to offer services from next year.

"We will try to be more competitive (to win contracts)," Rakesh Sasibhushan, chairman & managing director, Antrix Corp, said here on Tuesday.

Isro will also offer its heavier rocket geosynchronous satellite launch vehicle (GSLV-Mk-II) to customers to hurl two-tonne communication satellites into space, a market it sees would open up for India. "We are constrained by our capacity. Because of the cryogenic engine, we can only build so many rockets," said Sasibhushan.

The operational GSLV Mk-II rocket, with an indigenous cryogenic

'Antrix will appeal as bulwark against damages'

Antrix Corp will appeal against any verdict to protect itself from damages in the legal battle it is waging with Devas Multimedia, a satellite maker whose contract was cancelled by the government.

"The matter is sub judice. We will appeal against all judgments in any court," said Rakesh Sasibhushan, chairman & managing director, Antrix, here on Tuesday.

Satellite firm Devas Multimedia has informed Antrix Corp, the commercial arm of India's space agency, that it has sought approval from the courts in England and France to pursue action locally to recover \$672 million award it won from the International Commercial Court.

In September, Devas won the international tribunal award against Antrix over cancelling an order to lease two satellites to the country.

RAGHU KRISHNAN

upper stage, is expected to be launched later this year, taking weather satellite into space.

Isro is already building a consortium of public and private sector firms such as Hindustan Aeronautics, Godrej and Larson & Toubro to jointly assemble a PSLV launcher and offer it as a service to customers globally. At the same time, Isro is also offering satellite assembling technology to private firms, so that they look at global contracts to assemble them and launch in India. "Small satellites are going to become a big business for us," said Sasibhushan.

Antrix will share technology for building solar panels, sub-assemblies and components for companies that plan to enter the high-technology space business, he said. It will also expect local firms to indigenise components that are imported and being used in satellites, while ready to open up semiconductor labs, the country's only chipmaking facility to build components specifically for space requirements.

ಈ ತಿಂಗಳು 2 ಉಪಗ್ರಹ ಉಡಾವಣೆಗೆ ಇಸ್ರೊ ಸಜ್ಜು



ಬೆಂಗಳೂರಿನಲ್ಲಿ ನಡೆದ ಬೆಂಗಳೂರು ಸ್ಪೇಸ್ ಎಕ್ಸ್‌ಪೋ, ವಿಶ್ವ ಬಾಹ್ಯಾಕಾಶ ಪ್ರದರ್ಶನ ಮೇಳವನ್ನು ಉದ್ಘಾಟಿಸಿದ ಇಸ್ರೊ ಅಧ್ಯಕ್ಷ ಎ.ಎಸ್.ಕಿರಣ್ ಕುಮಾರ್

■ ಪಿಟಿಐ ಬೆಂಗಳೂರು

ಭಾರತೀಯ ಬಾಹ್ಯಾಕಾಶ ಸಂಶೋಧನಾ ಸಂಸ್ಥೆ ಇಸ್ರೊ, ಸರಾಸರಿ ತಿಂಗಳಿಗೊಂದರಂತೆ ಉಪಗ್ರಹಗಳ ಉಡಾವಣೆಗೆ ಮುಂದಾಗಿದ್ದು, ಸೆಪ್ಟೆಂಬರ್ 8ಕ್ಕೆ ಇನ್‌ಸ್ಟಾಟ್ 3 ಡಿಲಿವರಿ ಹಾಗೂ ತಿಂಗಳಿನ ಕೊನೆಯಲ್ಲಿ ಅಲ್ಟೀರಿಯಾದ ಉಪಗ್ರಹವೊಂದನ್ನು ಉಡಾವಣೆಗೊಳಿಸಲಿದೆ. ಬೆಂಗಳೂರು ಸ್ಪೇಸ್ ಎಕ್ಸ್‌ಪೋ ಕಾರ್ಯಕ್ರಮದ ನೇಪಥ್ಯದಲ್ಲಿ ಇಸ್ರೊ ಅಧ್ಯಕ್ಷ ಎ.ಎಸ್.ಕಿರಣ್ ಕುಮಾರ್ ಅವರು ಗುರುವಾರ ಸುದ್ದಿಗಾರರಿಗೆ ಈ ವಿಷಯ ತಿಳಿಸಿದ್ದಾರೆ. ಆಗಸ್ಟ್ 28ಕ್ಕೆ ಉಡಾವಣೆಯಾಗಬೇಕಿದ್ದ ಇನ್‌ಸ್ಟಾಟ್ -3 ಡಿಲಿವರಿ ಉಪಗ್ರಹ ತಾಂತ್ರಿಕ ಸಮಸ್ಯೆಯಿಂದ ಮುಂದೂಡಿಕೆಯಾಗಿತ್ತು.

Huge potential in small satellites biz: Antrix chief

EXPRESS NEWS SERVICE
@Bengaluru

Noting the significant potential in the small satellite market for Indian industries, Rakesh S, Chairman and Managing Director of Antrix, the commercial arm of Indian Space Research Organisation (ISRO) urged them to focus on the multi-billion dollar industry.

The small satellite market will grow to \$16 billion in India and \$335 billion globally in the next five years, he said. During the period, he said that 2,000 to 2,500 small satellites will be launched globally and Indian industry should benefit from the

development.

Addressing a press meet here on Tuesday, he said that though the industry was partnering with them, the relationship has been similar to that of a contractor and a service provider.

He said that industries interested to invest in the small satellite sector will have to grow in phases. "There is a lot of potential in the small satellites segment and subsystems segment where they will have to focus on," he said.

Commercial opportunities

Antrix, he said, will explore commercial opportunities of

Geosynchronous Satellite Launch Vehicle (GSLV) Mark III, which is the most powerful rocket developed by ISRO.

Rakesh said that irrespective of the number of opportunities, the number of GSLV launches will be fewer than PSLV.

ISRO is likely to develop 68 more commercial satellites in the current financial year, he added. He declined to answer a question on the controversial Antrix-Devas deal, maintaining

that the issue is sub-judice.

Space Expo

The fifth Bengaluru Space Expo will be held between September 1 and 3. During this edition of the Expo, there will be business-to-business sessions which will allow industry to explore options with Antrix. Technical sessions focusing on key areas will also be held during the period, said Rakesh.



The industries must start designing and developing subsystems and eventually satellites. ISRO is ready to help by making the necessary technology transfers.

Rakesh S, Chairman and Managing Director of Antrix

Express News Service

'ವರ್ಲ್ಡ್ ಸ್ಪೇಸ್ ಬಿಲ್ಡ್' ಕಾರ್ಯಕ್ರಮದಲ್ಲಿ ಇಸ್ರೊ ಆಧ್ಯಕ್ಷ ಎ.ಎಸ್.ಕಿರಣ್ ಕುಮಾರ್ ವಿಶ್ವಾಸ

ಅನ್ಯ ಗ್ರಹದಲ್ಲೂ ಗಣಿಗಾರಿಕೆ ಸಾಧ್ಯ

ಪ್ರಜಾವಾಣಿ

ಬೆಂಗಳೂರು: 'ವರ್ಲ್ಡ್ ಸ್ಪೇಸ್ ಬಿಲ್ಡ್' ಕಾರ್ಯಕ್ರಮದಲ್ಲಿ ಇಸ್ರೊ ಆಧ್ಯಕ್ಷ ಎ.ಎಸ್.ಕಿರಣ್ ಕುಮಾರ್ ವಿಶ್ವಾಸ

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ಮುಖ್ಯವಿಷಯಗಳು

- ಇದೇ 3 ರಂದು ಇಸ್ರೊ-3 ರೋಸೆಟ್ ಉಡಾವನೆ
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ISRO may do a 68-satellite single launch next year

SPECIAL CORRESPONDENT

BENGALURU: Next year, Indian Space Research Organisation (ISRO) may be beating its own record and sending 68 tiny satellites of a single customer into space on one rocket.

Its previous best was 20 on June 22 and the world's best multi-satellite launch to date is 32.

"We have many [upcoming commercial] launches. One particular launch we are planning with 68 nano-satellites is yet to be finalised," said S.Rakesh, Chairman and Managing Director of Antrix Corporation Ltd., in response to queries about future launch orders for the

PSLV. The 68 can be packed into smaller bundles each carrying four or more satellites - as was done for one customer in June. They will be tucked into spare spaces available on the launcher. ISRO may send them up along with a primary foreign satellite.

Antrix, as ISRO's commercial outfit, markets the PSLV internationally and has so far put 74 small, medium and so-called spacecraft in orbit for over 20 customers since the late 1990s. The global launch services market is around \$ 16 billion, he said.

Mr. Sasibhushan, along with Antrix officials and CII Karnataka Chairman Ravi Raghavan, gave details of the

fifth two-yearly Bangalore Space Expo (BSX) 2016 starting here on September 1.

ISRO has been trying to encourage Indian public and private sector industry to start making Indian launchers and satellite systems and then capitalise on the \$ 335-billion global space market. The three-day conference and exposition is meant to be a useful exposure in this.

About opportunities for industry, Mr. Sasibhushan said over 2,000 small satellites were planned to be launched globally in the next five years and this was a market worth \$ 16 billion. The conference will focus on small satellites, space-based navigation and startups.

CII task force to lay Space industry road map

MADHURAKTOSH DAS

BENGALURU: The Confederation of Indian Industry has formed a task force of leading companies that have ambitions in Space to write out a roadmap on developing a space ecosystem in the country.

A tentative committee of 15 public and private sector companies met during the fifth two-yearly World Space Biz/BSX-2016 conference,

which ended on Saturday, and discussed a broad agenda.

A CII official, who is involved in the consultations, told *The Hindu* that representatives of established and prospective suppliers to the Space programme - namely Godrej Aerospace, Tata Advanced Systems Ltd, Tata Mahindra Aerospace, L&T, Reliance Space, Antra Micro-wave - besides a few Bengaluru ventures participated in the first meeting of the committee. An expanded committee of decision makers will meet regularly under the lead of Antrix Corporation Ltd, the company under the

A tentative panel of 15 public and private sector companies met during the fifth World Space Biz conference

Department of Space, and come up with an action plan to create a solid, independent Space industry base as in the U.S. and Europe.

Call to play bigger role

The move comes at a time Indian Space Research Organisation has urged industry to take on bigger roles and double the number of satellites and launchers to 12-18 missions a year. It has suggested Space industry parks

at two locations. Today, ISRO assembles all satellites and their launchers while Antrix sells satellite images of Earth, transponder space and launch services. About 500 big, medium and small industries supply components and larger systems for the national Space programme.

ISRO, Antrix and CII have been hosting the event since 2008 with the same objective, the official said.

She tells stories about impact of human beings in space

CHITHYA ANAND

BENGALURU: Hers is a job title that even James Bond would envy — Alice Gorman, space archaeologist.

Dr. Gorman, a pioneer in the field, is an archaeologist who turned her eyes skyward and never looked down after that. She was in the city on Thursday as part of the Australian delegation at the Bengaluru Space Expo 2016 and delivered a talk at St. Joseph's College on the thrills of her profession.

Space archaeology is the study of human-made items in space, and the interpretation of these items to understand humankind's foray into space. Scientists such as Dr. Gorman, who work with the Department of Archaeology at Flinders University, Adelaide, Australia, use images and data from ongoing space missions to study the impact of human beings on planets and satellites.

On Chandrayaan

In an interaction with students, she spoke about how India's moon mission Chandrayaan-1 played an important role in furthering the cause of space archaeology. "Before landing, Chan-



Alice Gorman, space archaeologist

drayaan hovered over and captured images of earlier landing sites. It helped to retrace the steps of previous moon missions, and to build the story of man's mission on the moon," she said.

A popular blogger who goes by the name Dr. Space Junk, Dr. Gorman feels that space scientists interacting with the public — like NASA spacecraft Voyager 1 and Voyager 2 which together have a Twitter account handled by NASA scientists — humanises space technology. Another instance of humanising space technology is of Voyager 1 and Voyager 2 which carried phonograph records with sounds and images selected to portray the diversity of life. How readable the information will be if it is ever obtained by for-

Space scientists interacting with the public humanises space technology, says Alice Gorman

eign life remains a question. "It's funny that we hope aliens one day will be able to decipher the messages, when even children today wouldn't know what to do with a record," said Dr. Gorman.

The people who are most engaged with sharing information with the public are scientists who have worked on these projects, but they remain unrecognised, Dr. Gorman told *The Hindu*. "There is this idea of technology being cold and emotionless, and there's no space for people to have an emotion or attachment about it, but that's the stuff that makes our heritage," she said.

She feels that even inanimate objects in space have a story. "A probe records its last moments before crash landing. It's like it's filming its own death," she said. And it is her mission to preserve their story for future generations.

Six foreign satellites to be launched with Scatsat-1 this month-end

SPECIAL CORRESPONDENT

BENGALURU: Six small commercial satellites of foreign customers are slated to be launched this

month-end along with the ocean data gleaming Scatsat-1. ISRO Chairman A.S. Kiran Kumar said Algerian satellites and three others would be

launched on the PSLV.

On September 8, ISRO has lined up a GSLV launch carrying the weather satellite, INSAT-3DR.

ISRO CHIEF: NEED FOR MORE SATELLITES

DC CORRESPONDENT
BENGALURU, SEPT. 1

The Chairman of Indian Space Research Organisation (ISRO), A. Kiran Kumar, has said that there is a need to double the number of satellites we have at present, to provide adequate services for the various requirements of the country. He said this at a gathering of industrialists at the inauguration of the 5th edition of Bangalore Space Expo 2016 on Thursday.

Kiran Kumar said, "ISRO has successfully launched 138 satellites, of which 74 launches were for international communities. The remaining 34 satellites were for India." He continued, "The Indian space industry has a long way to go, in order to increase its launch frequency. At present we are doing one satellite launch in a month," he added.

Deccan Chronicle | 2 September 2016

The Hindu | 2 September 2016

'India has only half the satellites it needs'

SPECIAL CORRESPONDENT

BENGALURU: India's space capacity of 34 working satellites is barely half of what the country needs today and is severely limited to meet increasing demands from Central, State governments and businesses, A.S. Kiran Kumar, Chairman of the Indian Space Research Organisation, admitted here on Thursday.

ISRO plans to put 12-18 satellites in space each year to meet this demand and also wants to be free to pursue higher technologies. Domestic industry should urgently step into making satellites and launch vehicles, he told a gathering of Indian and overseas space supplies companies.

He was inaugurating the fifth two-yearly World Space Biz conference and Bangalore Space Expo organised with the Confederation of Indian Industry.

ISRO's satellites for communication, earth observation and navigation can connect people, exactly tell fisherfolk where to find fish; forecast crop yields, locate people or places; and help governments to govern and plan their projects.

Compared to 15 depart-



ISRO Chairman A.S. Kiran Kumar looking at the exhibits at the World Space Biz conference and Bangalore Space Expo in Bengaluru on Thursday. — PHOTO: PTI

“We need off-the-shelf rocket stages and systems. Industry role will ensure that ISRO does not become a rocket production house

K. Sivan,
VSSC Director

ments until recently, today over 60 Central departments and all State governments are demanding satellite-based solutions to govern ef-

ficiently.

“We are very significantly short of capacity in space. Probably, we need at least double the number that we have today to give reasonable service to the country,” Mr. Kiran Kumar said.

While industry already supplies small systems and components for spacecraft and rockets, he said this is not adequate. ISRO was working out ways for itself, its commercial arm — Antrix Corporation — and industry to interact and provide practical solutions. “We are trying to reach across to indus-

try and convey to them the opportunities in the space business segment and the technologies.”

Antrix CMD Rakesh Sashibhushan said the aim is to get industry involved in turnkey satellite solutions and building launch vehicles. The Indian industry can also reap the vast global opportunities worth \$335 billion.

CII's Deep Kapuria said he looked forward to having space-based traffic management and other spinoffs.

■ RELATED REPORTS | PAGE 6

Hunting ground for new tie-ups

SPECIAL CORRESPONDENT

BENGALURU: ISRO Chairman A.S. Kiran Kumar was right on the mark when he said on Thursday that space was exciting and had no limits to what you could do in the segment.

At least three of its overseas counterpart agencies floated interesting possibilities to be pursued jointly with India, during the ongoing World Space Biz conference or BSX 2016.

Jean-Yves Le Gall, president of French space agency CNES, said he looked forward to putting a “French eye” on a moon lander and rover of Indian startup Team Indus. The city-based young company is preparing to send a 600-kg lunar craft by December 2017 as a shortlisted global Google Lunar mis-

sion contestant.

The “French eye” is a micro-camera that will capture moon's details up-close and send back.

The Swiss Space Centre, which has earlier launched a tiny satellite on the PSLV, has just discussed with ISRO the possibility of jointly sending a small spacecraft to clean space debris or dead satellites. Its director Volker Gass said space debris was the nightmare of satellite operators. The active debris cleaner satellite is planned to capture expired spacecraft and burn them in space.

Four members from the Space Industry Association of Australia — their biggest team to date — are exploring collaborations with ISRO, Indian Institute of Science and university-level exchange programmes. International Astronautical Congress 2017 will be hosted in Adelaide.

DECCAN HERALD

DECCAN HERALD
Sport

IPC bans Russia from 2018 Para Winter Oly

WORLDWIDE **RUSSIA** has been banned from the 2018 Paralympic Winter Games in Pyeongchang, South Korea, after it was found to have covered up doping results from its athletes.

The International Paralympic Committee (IPC) said on Tuesday that it had banned Russia from the 2018 Paralympic Winter Games in Pyeongchang, South Korea, after it was found to have covered up doping results from its athletes.

Hales' ton powers England to record ODI total

Morgan's men make 444/3 in third ODI against Pakistan

POST-TEST **ENGLAND** set a new record for the highest ODI total of 444 in their third ODI against Pakistan in Karachi on Tuesday.

England's batsmen were in a superb mood after their victory in the first ODI on Sunday. They were in a superb mood after their victory in the first ODI on Sunday.



Joe Root celebrates his century during the ODI match.

Top ODI totals

- 444/3 England vs Pakistan, Karachi, Sep 20, 2016
- 441/3 India vs Australia, Sydney, Dec 11, 2015
- 438/3 South Africa vs India, Johannesburg, Sep 12, 2013
- 434/3 Australia vs India, Sydney, Dec 11, 2015
- 432/3 India vs Australia, Sydney, Dec 11, 2015

England's batsmen were in a superb mood after their victory in the first ODI on Sunday. They were in a superb mood after their victory in the first ODI on Sunday.

'Aussies will have to find a way past spin attack'

SYDNEY **IT** may be a long time before Australia can find a way past England's spin attack, but they will have to try.

The Australian batsmen were in a superb mood after their victory in the first ODI on Sunday. They were in a superb mood after their victory in the first ODI on Sunday.

CricInfo Second Test

Kiwis fall to Steyn's might as Proteas win

Pacer shines to help hosts clinch series

CAPE TOWN **THE** South African cricket team has won the second Test against New Zealand in Cape Town on Tuesday.

The Proteas batsmen were in a superb mood after their victory in the first Test on Sunday. They were in a superb mood after their victory in the first Test on Sunday.

NEW ZEALAND **THE** New Zealand cricket team has lost the second Test against South Africa in Cape Town on Tuesday.

The Kiwis batsmen were in a superb mood after their victory in the first Test on Sunday. They were in a superb mood after their victory in the first Test on Sunday.

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South African batsmen celebrate a century during the Test match.



Portrait of a man, likely a cricket player or official.

Yadav strikes for India Red

Blue reach 200/5 on day 2

COCHIN **INDIA** **THE** Indian cricket team has won the first day of the first Test against Sri Lanka in Cochin on Tuesday.

The Indians batsmen were in a superb mood after their victory in the first day of the first Test on Sunday. They were in a superb mood after their victory in the first day of the first Test on Sunday.



EXPLORE MULTIPLE BUSINESS OPPORTUNITIES IN INDIAN SPACE SECTOR

Visit **BENGALURU SPACE EXPO 2016 (BSX)**
1-3 SEPTEMBER 2016 | Timing: 9 AM to 5 PM

Featured Theme: "Industry participation for space systems production, infrastructure creation and applications delivery"

- 1. Only exhibition to host leading space agencies, satellite and technology
- 2. Around 10 participating from 10 countries including Canada, France, Japan, Germany, Hong Kong, Malaysia, Russia, Switzerland, Taiwan (ROC), Thailand, Ukraine and USA among others
- 3. International Conference - Share Space 2016 featuring participating from the leaders of 10 Space Agencies
- 4. BSC Session on Satellite Manufacturing by ISRO and ISAC involving India, Japan and International Power Systems
- 5. Platform for BSXs for working with Indian Space Agency

Witness the unique platform

Bengaluru International Exhibition Center (BIEC), Tunkur Road, Bengaluru | www.bsxindia.com



THE TIMES OF INDIA

TIMES NATION

19

THE TIMES OF INDIA, BENGALURU
WEDNESDAY, AUGUST 31, 2016

Centre alert on mosquito-borne threats

8,667 Cases Of Chikungunya In Kataka This Year

Byline: The Centre has issued a warning to states to be alert for mosquito-borne threats, including Dengue, Chikungunya and Zika virus. The Centre has issued a warning to states to be alert for mosquito-borne threats, including Dengue, Chikungunya and Zika virus. The Centre has issued a warning to states to be alert for mosquito-borne threats, including Dengue, Chikungunya and Zika virus.

STATE-WISE CHIKUNGUNYA CASES				
State	2015	2016	2017	2018
Andhra Pradesh	1,179	1,272	791	892
Goa	1,179	1,272	791	892
Madhya Pradesh	1,179	1,272	791	892
Odisha	1,179	1,272	791	892
Tamil Nadu	1,179	1,272	791	892
West Bengal	1,179	1,272	791	892
Total	1,179	1,272	791	892

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HC: Consumer is king, can't stop discounts by Ola, Uber

The Bench has held that consumers are king and cannot stop discounts offered by Ola and Uber. The Bench has held that consumers are king and cannot stop discounts offered by Ola and Uber. The Bench has held that consumers are king and cannot stop discounts offered by Ola and Uber.

2-judge SC bench gives legal lessons to 3-judge bench

The Bench has given legal lessons to the 3-judge bench. The Bench has given legal lessons to the 3-judge bench. The Bench has given legal lessons to the 3-judge bench. The Bench has given legal lessons to the 3-judge bench. The Bench has given legal lessons to the 3-judge bench.




EXPLORE MULTIPLE BUSINESS OPPORTUNITIES IN INDIAN SPACE SECTOR

Visit BENGALURU SPACE EXPO 2016 (BSX)
1-3 SEPTEMBER 2016 | Timing: 9:30 hrs - 17:00 hrs

Focuses three "Industry participation for space systems production, infrastructure creation and applications delivery"

- Only Exhibition in Asia focusing on Space, Satellite and its technologies
- Attract 15 participants from 15 countries including Canada, France, Japan, Germany, Malaysia, Russia, Indonesia, Switzerland, Thailand, Korea and USA covering an area of 1000 sqm.
- International Conference - Master Space 2016 BSX including an Exhibition from the leaders of the Space Agency
- 100 Sessions on Satellite Manufacturing by ISRO and ISAC including Solar Wings and Apollon Power Systems
- Participate by ISRO for meeting with other Space Agency

Witness the unique platform

Bengaluru International Exhibition Center (BIEC), Tumkur Road, Bengaluru | www.bsxindia.com

SUGGESTED LIST OF PARTICIPATING COMPANIES	
1. ISRO	2. ISRO
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AI pilots to pay price if caught drunk twice

The Bench has held that AI pilots must pay a price if caught drunk twice. The Bench has held that AI pilots must pay a price if caught drunk twice. The Bench has held that AI pilots must pay a price if caught drunk twice. The Bench has held that AI pilots must pay a price if caught drunk twice. The Bench has held that AI pilots must pay a price if caught drunk twice.



Government of India MINISTRY OF FOOD PROCESSING INDUSTRIES

"Reducing the distance between Farm & Fork"

Financial Assistance to set up Integrated Cold Chain Projects

Ministry of Food Processing Industries invites proposals for setting up 100 Integrated Cold Chain Projects in the country. The Ministry of Food Processing Industries invites proposals for setting up 100 Integrated Cold Chain Projects in the country. The Ministry of Food Processing Industries invites proposals for setting up 100 Integrated Cold Chain Projects in the country.

The amount of security deposit retained as performance security shall be submitted in the event of non-compliance of the project or withdrawing from the project after pending approval.

For further details, interested may be contacted:

Under Secretary to the Govt. of India
Tel. No. 011-26400529
Email: ugsp@moftp.gov.in





NPCI

Notice Inviting Bids for Procurement of RE Power

For details visit www.npci.org.in



NPCI

Notice Inviting Bids for Procurement of RE Power

For details visit www.npci.org.in

hindustan**times** hindustantimes.com

India bags deals to launch 68 foreign satellites, 12 of them from US

IANS, Bengaluru | Updated: Aug 30, 2016 23:09 IST



PSLV-C34 set a record in July by launching 20 satellites, with a combined weight of 1,288 kg including ISRO's 728 kg Cartosat-2 from its rocketport at Sriharikota in Andhra Pradesh, about 80 km north-east of Chennai.

(PTI)

India secured deals to launch 68 overseas satellites, including a dozen from the US, a top official said on Tuesday.

"We got fresh orders to launch 68 satellites from various countries, including 12 from PlanetiQ, a US-based weather forecasting satellite firm," said Rakesh Sasibhushan, Chairman and Managing Director of Antrix Corporation, the commercial arm of the Indian space agency.

Through Antrix, the state-run Indian Space Research Organisation (ISRO) has launched 74 foreign satellites, including many from advanced countries like Belgium, Britain, Canada, France, Germany, Israel and the US over the 15 years, using its most reliable workhorse - the Polar Satellite Launch Vehicle (PSLV).

"We also got an order to launch a heavier earth observation satellite from an overseas customer", said Sasibhushan without naming the customer.

Continue...

The new orders include launching smaller and nano-satellites with different payloads (instruments) for experiments, data generation, image-capturing and transmitting signals for communications, broadcasting, remote-sensing, earth observation and weather conditions.

PSLV-C34 set a record in July by launching 20 satellites, with a combined weight of 1,288 kg including ISRO's 728 kg Cartosat-2 from its rocketport at Sriharikota in Andhra Pradesh, about 80 km north-east of Chennai.

"We plan to carry more satellites in a single launch at a time for optimal utilisation of the rocket space and other resources for achieving economies of scale," hinted Sasibhushan.

"We estimate that about 2,500 satellites will be built in the next decade to meet the needs of countries and private customers for navigation, maritime, surveillance and other spacebased applications," Sasibhushan told reporters ahead of the fifth biennial Space Expo from Thursday in Bengaluru.

One Web, a global consortium of British multinational Virgin Group, Indian telecom major Bharti Enterprises and US-based chip maker Qualcomm, is planning to put a record 648 smaller satellites as a constellation to beam high-speed internet to local terminals.

ISRO also is bracing up for commercial launch of two-tonne and above satellites using its heavier rocket -- Geosynchronous Satellite Launch Vehicle (GSLV) to place them in geostationary orbits, about 36,000 km from the earth.

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The operational GSLV Mk-II rocket with an indigenous cryogenic upper stage is set for launch in September with a weather satellite onboard.

"We are looking for commercial operations of GSLV for which the indigenous cryogenic engines are getting ready to launch more satellites to the geo-orbits," noted Sasibhushan.

With more nations and private customers keen on having their own satellites for various applications, India is pitching in the multi-billion dollar launch market due to shortage of rockets and launchers worldwide and owing its cost advantage.

ISRO, however, will face competition from global players such as BlueOrigin, Firefly Systems, Rocket Lab and SpaceX, which are bracing up to offer satellite launch services from 2017.

hindustan**times** hindustantimes.com

Isro to launch two satellites in September

PTI, Bengaluru | Updated: Sep 01, 2016 16:49 IST



ISRO that had braced itself for one satellite launch every month is planning two launches this month. (File Photo)

Indian Space Research Organisation (ISRO) that had braced itself for one satellite launch every month is planning two launches this month.

“INSAT-3DR is scheduled for September 8 and by end of September we will have ScatSat along with an Algerian satellite as its co-passenger,” ISRO chairman A S Kiran Kumar told reporters here on the sidelines of Bangalore Space Expo-2016 (BSX-2016).

The launch of GSLV (Geosynchronous Satellite Launch Vehicle) Mark II carrying the geostationary weather satellite INSAT-3DR was earlier postponed due to a technical issue found in a satellite component while carrying out tests.

It was earlier scheduled for launch on August 28.

INSAT-3DR is a follow-on to INSAT-3D which entered space in 2013 from French Guiana.

The spacecraft was flagged off to Satish Dhawan Space Centre at Sriharikota on August 5 from ISRO Satellite Centre here.

To be launched by the end of this month, ScatSat is an indigenously developed weather forecasting satellite.

It will also have the capability to monitor sea surface winds and predict cyclones.

Polar Satellite Launch Vehicle (PSLV) will be used to launch this satellite that is expected to replace Oceansat-2 which is completing its lifespan.

An Algerian satellite along with two other satellites will be co-passengers to ScatSat during this launch, ISRO officials said.

THE HINDU

CITIES » BENGALURU

Published: September 1, 2016 13:43 IST | Updated: September 1, 2016 18:37 IST Bengaluru, September 1, 2016

'India's space capacity is severely constrained'

• Special Correspondent



A visitor at the Bangalore Space Expo 2016 at BIEC on Thursday. Photo: Sudhakara Jain

ISRO chairman A.S. Kiran Kumar stresses on need for larger industry role in the space sector

India's space capacity of 34 working satellites of three categories is barely half of what it should be and is severely constrained to meet all demands in the country, the chief of the National Space Agency admitted here on Thursday.

It badly needs a larger industry role in making more satellites and launch vehicles at a faster pace, said A.S. Kiran Kumar, chairman of Indian Space Research Organisation (ISRO) and Secretary, Department of Space. He was speaking at an industry gathering at the Bangalore Space Expo 2016.

ISRO's satellites - for communication, earth observation and navigation - can exactly show fishing zones, forecast crop yields, locate object and people. Today, centre and all state governments are increasingly demanding space-based solutions for efficient governance and societal problems.

"However, we are significantly short of capacity in space. Probably, we need at least double the number that we have today to give reasonable service to the country," Mr. Kiran Kumar said.

While industry already supplies structures and components for spacecraft and rockets, he said the supply chain was not adequate. ISRO was finding effective ways for itself, its commercial arm Antrix and industry to interact and provide practical solutions using satellite technology.

"We are trying to reach across to industry and convey to them the opportunities in the space business segment and the technologies." Indian Industry can also reap the vast global opportunities worth \$335 billion today, he said.

Rakesh Sashibhushan, CMD of Antrix, said the aim is to get industry involved in turnkey satellite solutions and building launch vehicles.

Deep Kapuria of the Confederation of Indian Industry, which is co-hosting the three-day event, said he looked forward to having space-based traffic management and other spinoffs.

THE HINDU

NATIONAL

Published: September 1, 2016 17:00 IST | Updated: September 1, 2016 17:00 IST Bengaluru, September 1, 2016

ISRO to launch two satellites in September

• PTI

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An Algerian satellite along with two other satellites will be co-passengers to ScatSat during this launch, ISRO officials said.

THE ECONOMIC TIMES

India significantly short of capacity in space: ISRO chief

By PTI | Updated: Sep 01, 2016, 06.51 PM IST

BENGALURU: ISRO chairman A S Kiran Kumar today said the country is "significantly" short of capacity in space and there is a need to double the number of satellites.

"We are still significantly short of capacity in space, probably we need at least double the number of satellites of what we have today to give a reasonable level of service to the country," he said.

What this also meant was that the nation needs to enhance the ability to launch and also build

satellites at a much faster pace than being done at present, Kumar said after inaugurating the Bangalore Space Expo-2016 (BSX-2016) here.

Pointing out that today ISRO was able to push through one launch a month, he said it has to increase at least one and one-and-a-half to two times in the immediate future "if we have to provide effective solutions to the country, its government and monitoring requirements."

Kumar said, "We have set in process, we still have a long way to go because today we are not able to increase our launch frequency because the supply chain that exists today is still inadequate to meet our demand."

Recalling ISRO's journey so far, he said almost 138 missions had been completed with 74 satellites of the international community being launched along with India's primary satellites.

"We have a constellation of about 34 satellites with earth observation, communication, navigation and also space science being provided by space infrastructure that has been put in place," he said.

Noting that it has to be ensured that capabilities built are actually put to practical use, the ISRO chief said the current central and state governments are now realising that space technology and space technology-based tools have a very significant role in delivering good and efficient governance.

"We are seeing a spurt in activities at the government level, which is demanding greater and greater services to be provided," Kumar said.

He said in the last three and three-and-half decades, ISRO's efforts to engage with government agencies to make use of space technology and space technology-based tools had been a slow process.

ISRO was today piratically working with 60 central government departments and all state governments to enable them plan and monitor

activities better, he said, adding that this happened because the governments are realising the potential of geospatial technology,

communication, crowd sourcing and earth observation capabilities.

Delegates from 12 countries are attending the fifth edition of the biennial Bangalore Space Expo, organised by ISRO, its commercial arm Antrix and CII till September 3.

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THE HINDU

» TODAY'S PAPER » NATIONAL

Published: September 2, 2016 00:00 IST | Updated: September 2, 2016 06:11 IST BENGALURU, September 2, 2016

‘India has only half the satellites it needs’

• Special Correspondent

ISRO chief Kiran Kumar wants domestic industry to build satellites and launch vehicles



ISRO Chairman Kiran Kumar at the World Space Biz conference and Bangalore Space Expo on Thursday.— Photo: PTI

India's space capacity of 34 working satellites is barely half of what the country needs and is severely limited to meet increasing demands from the Centre, States and businesses, A.S. Kiran Kumar, Chairman of the Indian Space Research Organisation, said here on Thursday.

ISRO plans to put 12–18 satellites in space each year to meet this demand and also wants to be free to pursue higher technologies. Domestic industry should urgently step in to make satellites and launch vehicles, he told a gathering of Indian and overseas space supplies companies.

He was inaugurating the fifth World Space Biz conference and Bangalore Space Expo organised with the Confederation of Indian Industry.

ISRO's satellites for communication, earth observation and navigation can connect people, tell fisher folk where to find fish; forecast crop yields, locate people or places; and help governments govern and plan projects.

Today, over 60 Central departments – compared to 15 departments until recently – and all State governments were demanding satellite based solutions for governance.

“We are very significantly short of capacity in space. Probably, we need at least double the number that we have today to give reasonable service,” Mr. Kiran Kumar said.

While industry already supplied small systems and components for spacecraft and rockets, he said this was not adequate. ISRO was working out ways for itself, its commercial arm — Antrix Corporation — and industry to provide practical solutions.

Antrix CMD Rakesh Sashibhushan said the aim is to get industry involved in turnkey satellite solutions and building of launch vehicles. Indian industry can reap the vast global opportunities worth \$335 billion.

CII's Deep Kapuria said he looked forward to having space-based traffic management and other spin-offs.

Space is exciting At least three of ISRO's overseas counterparts have floated interesting possibilities to be pursued jointly with India.

Jean-Yves Le Gall, President of French space agency CNES, said he looked forward to putting a ‘French eye’ on a Moon lander and rover of Indian start-up Team Indus. The city-based company is preparing to send a 600-kg lunar craft by December 2017 as a shortlisted global Google Lunar mission contestant.

The French eye is a micro camera that will capture the Moon's details up close.

The Swiss Space Centre which has earlier launched a tiny satellite on the PSLV has discussed with ISRO the possibility of jointly sending a small space craft to clear space debris. Its Director, Volker Gass says space debris is a nightmare for operators, and a cleaner satellite can burn expired spacecraft.

Four members from the Space Industry Association of Australia are exploring collaborations with ISRO, Indian Institute of Science and universities.

Six more small commercial satellites of foreign customers are slated to be launched this month-end along with the ocean data gleaning Scattsat-1. ISRO Chairman A.S.Kiran Kumar said Algerian satellites and three others would be launched on the PSLV.

THE HINDU

» TODAY'S PAPER » KARNATAKA

Published: September 2, 2016 00:00 IST | Updated: September 2, 2016 06:04 IST September 2, 2016

[Space expo](#)



Up-close:Visitors at a stall at the three-day Bengaluru Space Expo 2016 which began in Bengaluru on Thursday.— Photo: AFP



Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895, India's premier business association has over 8000 members, from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 200,000 enterprises from around 240 national and regional sectoral industry bodies.

CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes. Partnerships with civil society organizations carry forward corporate initiatives for integrated and inclusive development across diverse domains including affirmative action, healthcare, education, livelihood, diversity management, skill development, empowerment of women, and water, to name a few.

The CII theme for 2016-17, **Building National Competitiveness**, emphasizes Industry's role in partnering Government to accelerate competitiveness across sectors, with sustained global competitiveness as the goal. The focus is on six key enablers: Human Development; Corporate Integrity and Good Citizenship; Ease of Doing Business; Innovation and Technical Capability; Sustainability; and Integration with the World.

With 66 offices, including 9 Centres of Excellence, in India, and 9 overseas offices in Australia, Bahrain, China, Egypt, France, Germany, Singapore, UK, and USA, as well as institutional partnerships with 320 counterpart organizations in 106 countries, CII serves as a reference point for Indian industry and the international business community.

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Confederation of Indian Industry

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