A Report on Industrial Visit

Sathish Dhawan Space Center (SDSC)SHAR,

Sriharikota, Andhra Pradesh

Organized by Department of Computer Science and Engineering

18 March 2023

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Attended Students and Faculty: 50 Students from I B.Tech with 3 Faculties from Department of Humanities and Sciences.

The Industrial Visit has started at 9.15 AM

About Sathish Dhawan Space Center (SDSC) SHAR:

SDSC SHAR - An island of technological excellence wherein nature co-exists with the Technocrats

Satish Dhawan Space Centre SHAR (SDSC SHAR), Sriharikota, the Spaceport of India, is one of the lead centres of Indian Space Research Organisation (ISRO), Department of Space (DOS), Government of India. The Centre provides world class launch base infrastructure for national and international customers in accomplishing diverse launch vehicle/satellite missions for remote

sensing, communication, navigation & scientific purposes and is one among the best known names of the Spaceports of the world today. The space centre, which was popularly known as SHAR (Sriharikota Range) was renamed as Satish Dhawan Space Centre SHAR on September 5, 2002, in fond memory of Prof. Satish Dhawan, former Chairman of ISRO.

The genesis of SDSC SHAR can be traced back to 1960s when the great visionary Dr. Vikram A Sarabhai embarked upon space research activities in the country and envisioned that "we must be second to none in the application of advanced technologies to the real problems of man and society". To venture on the indigenous development of satellites and their launch vehicles, it was decided to set up a rocket launch station on the East Coast of our country, far from populated areas. Features like a good launch azimuth corridor for various missions, nearness to the equator (benefiting eastward launches) and large uninhabited area for a safety zone have made Sriharikota the ideal location for the spaceport. This spindle shaped island in SPSR Nellore district of Andhra Pradesh, situated in the backwater Pulicat Lake and sandwiched by Buckingham Canal on the West and Bay of Bengal on the East, was chosen in 1969 for setting up the rocket launch station of our country. It became operational on October 9, 1971 with the flight of 'Rohini-125', a small sounding rocket. Since then the facilities here were gradually expanded to meet the growing needs of ISRO. Off Sullurupeta – a small town on the Chennai – Kolkata National highway (NH-5) – a 20 minutes drive towards the East, along the road laid across the Pulicat Lake takes one to Sriharikota.

Sriharikota covers an area of about 43,360 acres (175sq.km) with a coastline of 50km. Eucalyptus, casuarina plantation, scrub jungle vegetation (including a few medicinal herbs), groves of coconut & palm and cane breaks around shallow fresh water ponds dominate the landscape of Sriharikota. To offset the increased usage of land and to balance the nature, simultaneous action of forest regeneration has been contemplated and implemented in right earnest. All these measures have helped in the conservation of flora and fauna of Sriharikota. Both the South-West and the North-East monsoons serve the island. However, the later brings rains during October – December only, thus providing a large number of sunny days suitable for out-door static tests and launch operations. During October – December, thousands of migratory birds visit the Pulicat Lake from faraway places, turning the Sriharikota region into a veritable paradise for ornithologists and nature lovers.

About Industrial Visit:

The total 50 Students from I year with three faculties (Dr.S.Ramakrishna, Assistant Professor, Mrs.Rizwana, Assistant Professor and Mr.B.Kumar.Assistant Professor) from Computer Science & Engineering Department of BITS College of Engineering, Narsampet, Warangal, visited Sathish Dhawan Space Center (SDSC) SHAR, Sriharikota, AndhraPradesh.

The students visit schedule is as follows.

• 4.00 PM – 5.00 PM : Students are visited the SDSC SHAR exhibition gallery. In that, various satellite models are displayed and their activities are elaborated.

• 5.00 PM to 6.00 PM: Students are assembled in the Satellite launch Gallery, and they have explained about PSLV-F14/INSAT3DS services and also elaborated about various levels of Rocket separations. At 5.35 PM, PSLV-F14/INSAT-3DS satellite has launched and various satellite separations stages are shown.

• 6.30 PM: Departure.

Also the students met the Scientists working in the institute and shared their experiences. The scientists are explained the working principles of satellite and their features to the students.

Industrial Visit Photos:

SECOND LAUNCH PAD

This is the location that we see every time a launch is broadcast on television. The rocket is assembled and brought to the launch pad. The rocket is electrically insulated from lightning by 4 lightning protection towers. These towers also house high resolution cameras at several levels to monitor the various stages of the rocket. These cameras are protected by concrete enclosures.

The launch pad itself is about 70m high. This means that the protection towers are even taller. An anchor is present to hold the rocket in place until the time of blast off.

Separate pipes are present to deliver cryogenic fuels, which are supplied at 180 degrees Celsius. Finally, there are exhaust deflection ducts which deflect the exhaust gases through underground tunnels to a place which is a few tens of metres away. In case the flame returns to the rocket, balance will be lost and the rocket may topple. The tunnels are filled with water to reduce pressure and temperature. Also, cryogenic fuel tanks are available in separate towers. Each floor in the launch pad is 4m high. This launch pad is called 'umbilical' due to the presence of the pipes which feed fuel to the rocket.

FIRST LAUNCH PAD

Unlike the 'umbilical' type, this is a pedestal type. The whole tower moves away from the rocket just before the blast off. As there is a PSLV launch in the next month and that process was taking place at the time, entry was denied and we were allowed to see this from a distance.

MISSION CONTROL CENTRE

The mission control is the focal point of controlling the vehicle. There are 8 'hold buttons' at different places around the range. In case of abnormalities in subsystems (affecting the health of the rocket), the hold button is used to terminate the countdown. In case the abnormality has been resolved, the first row is used to supervise the control of the launch vehicle. The second and third rows control the operations on the vehicle. Various chiefs of operations are seated in these rows. These computers are connected by Ethernet and fibre optics.

There is a separate ring safety server which is controlled by a senior scientist. In case of abnormalities in the path of the rocket, this person can detonate the rocket so that the rocket is blown up over the sea and does not affect neighboring human population. There are 45 levels of information relating to the launch of the rocket. The vehicle Director authorises the launch at (t16) minutes. An automatic sequence program checks the health of the rocket (with respect to various parameters) and ensures that any deviations in the parameters are within specific limits.

ASSEMBLY AND STATIC TEST AND EVALUATION COMPLEX

• Two buildings constitute the complex – the assembly building and the test buildings which are placed adjacent to each other. Motors which are in excess of 2m diameter are present and they are fabricated in Mumbai.

• Several tests are done on a launch vehicle, such as vibration test, centrifugal test, and static test. Of these, only the static test is done in SHAR. There are two kinds of static tests – ballistic test and the other is to optimize insulation. After assembly, the motors are tilted horizontally and they are integrated to floating members. From a calibration curve, the strain is converted to thrust and the motor is characterized. Flexible nozzles of the strap on motors are also tested on this test bed.

• At around 10.30 am Murali, Scientist/Engineer-SF, Entity, has addressed the students with all the technical information related to SHAR.. At around 2.15. P.M., we had lunch at ARYABHATTA canteen facility at SHAR. After having our Lunch, visited the Space Museum and the Library facility at SHAR. Here , we were allowed to take the Photographs, where we got an opportunity to know about the History of SHAR with the aid of many models related to the centre , visit was concluded and the students has started to at around 5.30 P.M., moved to the Hotel facility where accommodation was provided and concluded the day.

Dr.S.Ramakrishna, Mrs.Rizwana, Mr.B.Kumar expressed him & her thanks to SDSC SHAR scientists and their team for providing this wonderful opportunity. Students and faculty coordinators expressed their special thanks and gratitude to HoD Mr.G.Srinivas and Principal Dr.V.S.Hariharan and Management for the permission and support for this memorable industrial visit.

Outcomes:

At the end of Program, Students can able to,

1.Understand about the various satellites launched by our nation and also understand about their configurations and features.

2.Gained the knowledge about the Satellite launch process with including the various rocket separation stages and working principles.

3.Enrich their skill about the roles of computer science and engineering in Department of space.

4.Understand about the multi-disciplinary research and their important. 5.They can able to work with the collaborative research and their interdisciplinary research skills are improved.