SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)-Chittoor.

(Approved by AICTE, New Delhi and Affiliated to JNTUA, Ananthapuramu)

INDUSTRIAL VISIT

ORGANIZED BY DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR: 2024-25

NAME OF THE INDUSTRIAL VISITED	**:**	**SDSC-SHAR**
PLACE OF THE INDUSTRIAL VISITED	**:**	**SRIHARIKOTA**
DATE OF VISITED	**:**	**22/08/2024**
YEAR OF STUDENTS	**:**	**III YEAR (A, B & C/SEC)**
STRENGTH OF STUDENTS APPROVED	**:**	**100**
NAME OF THE FACULTY's VISITED	**:**	**Mr. V. S. MOHAMMAD SHAHIL (IV-INCHARGE,CSE)** **Dr. SAKTHI GOKUL (ASSOCIATE PROFESSOR,CSE)** **Mr. R RAMESH HALAKURKI (ASST. PROF.,EEE)** **Mr. RANGANAYAKULU (LIBRARY INCHARGE)** **Ms. DEEPIKA (ASSISTANT PROFESSOR,CAI)**

The objective of the industrial visit to ISRO's Satish Dhawan Space Centre (SDSC) SHAR is to provide 3rd-year students with practical exposure to advanced space technologies and operations. This visit aims to enhance their understanding of rocket launches, satellite integration, and space research initiatives. By observing the real-time working environment and interacting with professionals, students will gain insights into the applications of engineering and technology in space exploration, which will bridge the gap between theoretical knowledge and practical implementation.

ABOUT ISRO AND SDSC SHAR:

ABOUT ISRO:

Indian Space Research Organisation (ISRO) is the space agency of India. The organisation is involved in science, engineering and technology to harvest the benefits of outer space for India and the mankind. ISRO is a major constituent of the Department of Space (DOS), Government of India. The department executes the Indian Space Programme primarily through various Centres or units within ISRO.

ISRO was previously the Indian National Committee for Space Research (INCOSPAR), set up by the Government of India in 1962, as envisioned by Dr.Vikrama Sarabhai. ISRO was formed on August 15, 1969 and superseded INCOSPAR with an expanded role to harness space technology. DOS was set up and ISRO was brought under DOS in 1972.

The prime objective of ISRO/DOS is the development and application of space technology for various national needs. To fulfil this objective, ISRO has established major space systems for communication, television broadcasting and meteorological services; resources monitoring and management; space-based navigation services. ISRO has developed satellite launch vehicles, PSLV and GSLV, to place the satellites in the required orbits.

Alongside its technological advancement, ISRO contributes to science and science education in the country. Various dedicated research centres and autonomous institutions for remote sensing, astronomy and astrophysics, atmospheric sciences and space sciences in general function under the aegis of Department of Space. ISRO's own Lunar and interplanetary missions along with other scientific projects encourage and promote science education, apart from providing valuable data to the scientific community which in turn enriches science.

ISRO has its headquarters in Bengaluru. Its activities are spread across various centres and units. Launch Vehicles are built at vikramsarabhai Space Centre (VSSC), Thiruvananthapuram; Satellites are designed and developed at U R Rao Satellite Centre (URSC), Bengaluru; Integration and launching of satellites and launch vehicles are carried out from Satish Dhawan Space Centre (SDSC), Sriharikota; Development of liquid stages including cryogenic stage is carried out at Liquid Propulsion Systems Centre (LPSC), Valiamala & Bengaluru; Sensors for Communication and Remote Sensing satellites and application aspects of the space technology are taken up at Space Applications Centre (SAC), Ahmedabad and Remote Sensing satellite data reception processing and dissemination is entrusted to National Remote Sensing Centre (NRSC), Hyderabad.

The activities of ISRO are guided by its Chairman, who would also be the secretary of DOS and Chairman of Space commission – the apex body that formulates the policies and overseas the implementation of the Indian Space Programme.

ABOUT 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), and 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.

SUMMARY OF THE VISIT:

The industrial visit started at 5:30 AM from the college, and we reached Naidupeta by 8:30 AM, where we were provided with accommodation at Kinnera Grand Hotel for fresh-up and breakfast. By 10:30 AM, we reached ISRO SDSC after completing the security check and stored our belongings at the central library. The visit commenced with a video presentation, "GATEWAY to Space," showcasing ISRO's history and current facilities on the central Building.

Following the video, we were guided by Mr. P. Gopi Krishna, Group Director, who led us through the Mission Control Centre, explaining the systems, operations, and the role of the control centre staff. We watched video demonstrations and then moved to the second and first launch pads, where Mr. Gopi Krishna explained the operations and projects conducted at each pad.

After exploring the launch pads, we had lunch at the canteen, retrieved our belongings, and took group photos at the entrance. On the way back, we visited Srikalahasti Temple and arrived safely back at the college.

THE GATEWAY TO SPACE VIDEO:

The "Gateway to Space" video by ISRO offers an inspiring and comprehensive overview of India's journey into space exploration. It starts with a glimpse into the early days of ISRO (Indian Space Research Organisation), highlighting its humble beginnings and vision of self-reliance in space technology. The video showcases ISRO's major achievements, including the development of satellite technology, the establishment of launch facilities like the Satish Dhawan Space Centre (SDSC SHAR), and its evolution into a globally respected space agency.

Key milestones, such as the successful launch of satellites, lunar and Mars missions (like Chandrayaan and Mangalyaan), and the establishment of communication networks, are presented, reflecting ISRO's role in nation-building and its contributions to fields such as telecommunications, agriculture, weather forecasting, and disaster management.

The video also dives into the advanced technologies and current facilities that drive ISRO's ongoing missions, including satellite development, launch vehicle advancements (like PSLV and GSLV), and the exploration of new frontiers in space research. It inspires students and the general public by emphasizing ISRO's dedication to innovation, collaboration, and future space exploration goals, which continue to put India on the global space exploration map.

The "Gateway to Space" video serves as a powerful testament to ISRO's vision of harnessing space technology for the betterment of society, while inspiring future generations to pursue careers in science and engineering.

The GSLV and PSLV are the two launch vehicles used currently by ISRO to launch satellites into the geosynchronous and polar orbits respectively. The GSLV has 3 stages - the first is a solid (fuel) stage, the second a liquid (fuel) stage and the third is a cryogenic stage. The satellites launched so far have applications such as National development/infrastructure, telecom, disaster warnings, resource management, etc.

The PSLV can launch multiple satellites simultaneously at a low cost and high reliability. The various facilities at SDSC were listed and their functions are explained in brief. Weather prediction is another important factor at the time of launch, and the SHAR boasts of this facility too. The latest addition to the SDSC was the S200 propellant plant. The strap on motors, their dimensions and use were elucidated.

The countdown begins at (t-57) hours. At this time, the liquid propellants are filled into the system. At (t-16) hours, the mobile service car is withdrawn and the system is connected to the Launch and Mission control centre (which are placed 6km from the launch site) through electrical wires only.

The cryogenic fuel is set around the launch site. The performance is monitored in real time. At about 17 minutes after blast off, the GSLV completes the mission - puts the satellite in geosynchronous orbit. After this, students were taken to several locations within the SDSC, with a guide to explain the locations.

MISSION CONTROL CENTRE:

The **Mission Control Centre (MCC)** at **ISRO's Satish Dhawan Space Centre (SDSC), Sriharikota**, is the nerve centre for all launch operations and is responsible for overseeing and controlling satellite launches. It plays a pivotal role in monitoring, managing, and executing various stages of a space mission, from pre-launch checks to post-launch satellite deployment. The MCC is equipped with sophisticated technology and communication systems, making it one of the most critical facilities at SDSC.

Key Functions of the Mission Control Centre:

1. **Launch Monitoring**: The MCC monitors all aspects of a satellite launch, including the countdown, fuel levels, system checks, and weather conditions. This ensures a smooth and safe launch process.
2. **Real-Time Data Processing**: During a launch, the MCC processes real-time data from the launch vehicle and its systems. This data includes telemetry (information on the

vehicle's speed, altitude, and health), which is critical for tracking the progress of the mission.

3. **Coordination Hub**: The MCC serves as the central coordination point for all teams involved in the mission. It connects the launch team at SDSC, satellite team, and ground stations to ensure smooth communication and prompt decision-making.
4. **Command and Control**: The centre is responsible for sending commands to the launch vehicle and making necessary adjustments during flight. It can issue critical instructions if a problem arises during the launch or mission.
5. **Flight Safety**: The MCC is responsible for ensuring the safety of the launch vehicle and payload. It monitors flight trajectories and can abort the mission in case of a significant anomaly to avoid risks to public safety or mission failure.
6. **Post-Launch Operations**: Once the satellite is deployed in orbit, the MCC continues to monitor the vehicle's status and health, ensuring that it follows the planned trajectory and performs as expected.
7. **Control Room Setup**: The MCC has multiple consoles manned by scientists and engineers, each responsible for different aspects of the mission, such as propulsion, guidance, navigation, and satellite communication.
8. **Backup Facilities**: It has backup systems to ensure that, in case of a failure or emergency, mission-critical data and control operations can continue without interruption.

SECOND LAUNCH PAD:

The **Second Launch Pad (SLP)** at **ISRO's Satish Dhawan Space Centre (SDSC), Sriharikota**, is one of the most advanced and crucial launch facilities in India's space program. Commissioned in **2005**, the second launch pad was developed to support ISRO's growing satellite launch demands, enhancing its capability to undertake more frequent and heavier launches. It is equipped to handle both **Polar Satellite Launch Vehicles (PSLV)** and **Geosynchronous Satellite Launch Vehicles (GSLV)**, providing flexibility for launching various types of satellites into different orbits.

Key Features of the Second Launch Pad:

1. **Fully Automated Systems**: The SLP is equipped with advanced automated systems for vehicle assembly, integration, and launching, ensuring precise and safe operations.
2. **Launch Capabilities**: The pad supports the launching of heavier payloads, including **GSLV Mk III**, which can carry larger satellites and is critical for India's deep-space missions.
3. **Mission Diversity**: It is used for launching communication satellites, Earth observation satellites, and for prestigious missions like **Chandrayaan-2** and **Mangalyaan**.
4. **Umbilical Tower**: The second launch pad features a large umbilical tower with service arms that provide support during the launch vehicle's pre-flight stages, such as fuelling, electrical connections, and checks before lift-off.

5. **Mobile Launch Pedestal**: It has a mobile launch pedestal that allows for the quick movement of the launch vehicle from the Vehicle Assembly Building to the launch pad, ensuring operational efficiency.
6. **Safety and Control Systems**: It includes state-of-the-art safety mechanisms and control systems, as well as secure communication links with the **Mission Control Centre (MCC)**, where the mission directors monitor and control the launch process.

The second launch pad is crucial to ISRO's long-term mission goals, enhancing India's capability for launching a wide variety of satellites and supporting more complex space exploration projects. This pad plays a significant role in helping ISRO achieve its vision of expanding its presence in space exploration, both in terms of national projects and international collaborations.

Notable Missions from the Second Launch Pad:

Here are seven notable missions launched from the **Second Launch Pad (SLP)** at ISRO's Satish Dhawan Space Centre (SDSC), Sriharikota:

1. **GSAT-15**: Launched on **November 5, 2015**, this mission deployed the **GSAT-15** communication satellite, enhancing telecommunication services across India by providing additional transponders and increasing capacity.
2. **GSAT-19**: Launched on **June 5, 2017**, the **GSAT-19** satellite was equipped with high-throughput transponders to support telecommunication, television broadcasting, and satellite-based internet services.
3. **GSAT-29**: Launched on **November 14, 2018**, this mission involved the deployment of the **GSAT-29** satellite, designed for experimental applications and advanced communication, including high-throughput and flexible payloads.
4. **GSAT-30**: Launched on **January 17, 2020**, the **GSAT-30** satellite was intended to enhance and expand telecommunication services and provide improved capacity for existing networks.
5. **Chandrayaan-2**: Launched on **July 22, 2019**, this mission was India's second lunar exploration endeavor, featuring an orbiter, a lander (Vikram), and a rover (Pragyan) to study the moon's surface and enhance lunar exploration.
6. **Astrosat**: Launched on **September 28, 2015**, **Astrosat** was India's first dedicated multi-wavelength space observatory, aimed at studying celestial sources in various wavelengths and expanding astrophysical research.
7. **Cartosat-2 Series**: Launched on **January 7, 2016**, the **Cartosat-2** series satellite was used for high-resolution Earth observation, cartographic applications, and providing detailed imagery for various applications including urban planning and disaster management.

FIRST LAUNCH PAD:

The **First Launch Pad (FLP)** at the **Satish Dhawan Space Centre (SDSC), Sriharikota**, is a key facility in India's space exploration efforts and has been integral to the launch of numerous ISRO missions. Commissioned in **1993**, the first launch pad was built to support the launch of both **Polar Satellite Launch Vehicles (PSLV)** and **Geosynchronous Satellite Launch Vehicles (GSLV)**. It marked a significant milestone in ISRO's capabilities, allowing India to conduct independent satellite launches and reduce its reliance on foreign launch providers.

Key Features of the First Launch Pad:

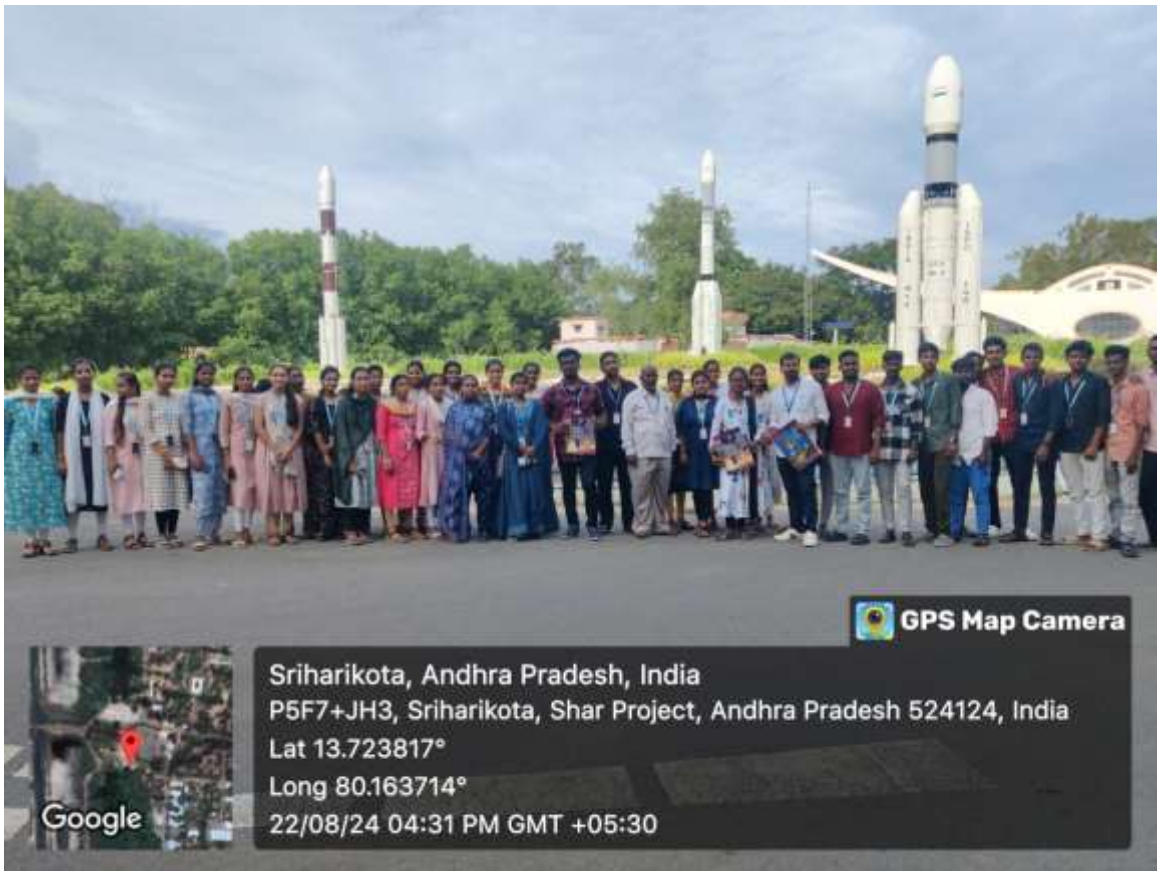
1. **Launch Vehicle Support**: The FLP is designed to support both PSLV and GSLV vehicles, making it versatile for launching satellites into low Earth orbit (LEO) and geostationary orbits. Over the years, it has played a vital role in deploying communication, Earth observation, and scientific satellites.
2. **Umbilical Tower**: The first launch pad includes a fixed umbilical tower that provides essential services to the rocket during the pre-launch phase. These services include fuel loading, electrical connections, and communication links with the launch control room.
3. **Assembly and Integration**: Rockets are assembled and integrated on the mobile service tower, which can be moved away from the launch vehicle before lift-off. This feature enables efficient assembly and testing procedures, reducing the turnaround time between launches.
4. **Mobile Launch Platform**: The FLP is equipped with a mobile launch pedestal on which the rocket is assembled. This platform is transported to the launch pad from the Vehicle Assembly Building (VAB) via a rail system.
5. **Mission Diversity**: The first launch pad has been the site of some of India's most important missions, including the first PSLV and GSLV launches. It also supported the launch of several notable missions like **Chandrayaan-1**, India's first lunar mission, and **Mangalyaan**, the Mars Orbiter Mission.
6. **Safety Systems**: The FLP is equipped with advanced safety features to ensure the secure and safe handling of launch vehicles, including emergency shutdown systems and fire suppression mechanisms.
7. **Launch Operations**: The pad is used for final checks and fueling of the launch vehicle. Engineers at the pad and the **Mission Control Centre (MCC)** closely monitor the countdown and execute the launch sequence.

Notable Missions from the First Launch Pad:

1. **PSLV-C11**: Launched **Chandrayaan-1** in 2008, India's first mission to the moon.
2. **PSLV-C25**: Launched **Mars Orbiter Mission (Mangalyaan)** in 2013, making India the first country to reach Mars on its first attempt.
3. **GSLV Mk II**: Launched various communication satellites and the **GSAT series** from this pad.

GROUP PHOTO AT ISRO (III CSE A/SEC)

GROUP PHOTO AT ISRO (III CSE B/SEC)



GROUP PHOTO AT ISRO (III CSE C/SEC)

GROUP PHOTO AT ISRO (COORDINATOR's)

Photo's Link : https://drive.google.com/drive/folders/1f71tHAYXametiFxTnFbqafz-vNs_yQwV?usp=drive_link

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