

Information Science and Engineering

Report and Summary on Industrial Visit to U R Rao Satellite Centre (URSC), ISRO, Bengaluru



The purpose of this industrial visit report is to comprehensively document the experiences, learnings, and observations made during the visit to the **U R Rao Satellite Centre (URSC)**, **Indian Space Research Organisation (ISRO)**, Bengaluru. This report aims to capture the technical insights gained through interactions with experts, exposure to advanced satellite design and testing facilities, and an understanding of the practical implementation of space technology. Furthermore, it serves as constructive feedback to the organizers and acts as a valuable reference for future industrial visits and academic research activities.

Industrial Visit Details:

Date of Industrial Visit: 04-10-2025

Name of the Industrial Facility: U R Rao Satellite Centre (URSC), ISRO, Bengaluru

Prepared For: Dr. Y. Vijaya Kumar, Principal, JNN College of Engineering, Shivamogga

Mode of Transportation: JNN College of Engineering Bus

Submitted Through: Dr. Raghavendra R. J, Head of the Department of Information Science and Engineering, JNNCE, Shivamogga.

Coordinating Faculty Members:

1. Dr. Pavan Kumar M. P.
2. Dr. Chethan G S,
3. Mr. Arun Kumar P,
4. Mr. Anil Kumar.

Report Prepared by: Dr. Pavan Kumar MP, Associate Professor, Dept., of ISE, JNNCE, Shivamogga.

Executive Summary:

The industrial visit to the U R Rao Satellite Centre (URSC), Indian Space Research Organisation (ISRO), Bengaluru, organized under the **IEEE Computer Society Student Chapter** of the Department of Information Science and Engineering, JNN College of Engineering, Shivamogga, served as a pivotal platform bridging the gap between academic learning and real-world space technology applications. The visit provided students with valuable insights into satellite design, development, integration, and testing processes, along with exposure to advanced research facilities and ongoing projects. This program aimed to cultivate a dynamic learning environment that fosters innovation, encourages higher studies such as Master's and Doctoral programs in premier institutions like IISc and IITs, promotes collaboration with research organizations, and enhances the overall professional growth of students for future technological advancements.

Introduction

The **U. R. Rao Satellite Centre (URSC)**, a key unit of the **Indian Space Research Organisation (ISRO)**, is a premier hub for designing, developing, and testing satellites. It has contributed to several national and international missions supporting communication, navigation, meteorology, remote sensing, and interplanetary exploration. Industrial visits like this play a crucial role in bridging academic knowledge with real-world applications.

By visiting URSC, students gained practical exposure to satellite technology, observed various stages of spacecraft development and testing, and interacted with scientists and engineers. This experience enhanced their understanding of space research and inspired them to pursue higher studies and careers in this field.

The **industrial visit to URSC, ISRO, Bengaluru**, was organized on **4 October 2025** under the guidance of the **IEEE Computer Society Student Chapter**, Department of Information Science and Engineering, JNN College of Engineering, Shivamogga. A total of **47 students** participated in the visit, accompanied by **four faculty coordinators**. The team departed from the college campus on **4 October 2025 at 2:00 a.m.** by the college bus and returned safely on **5 October 2025 at 7:00 a.m.** The visit was conducted in accordance with the consent and information letter shared with parents, which outlined travel details, safety guidelines, and instructions regarding dress code, discipline, and student conduct throughout the trip.

During the visit, students had the opportunity to explore research laboratories, interact with scientists and engineers, and gain valuable insights into satellite technology and space research.

The visit served as an inspiring and educational experience, motivating students to pursue higher studies and research in the field of space technology.

Purpose and Objectives of the Visit

The industrial visit to the **U. R. Rao Satellite Centre (URSC), ISRO, Bengaluru**, aimed to provide students with practical exposure to satellite technology and inspire them toward innovation and research in space science. The key objectives were:

- **Gain Practical Exposure:** Understand real-world satellite design, development, and testing processes.
- **Understand Industrial Processes:** Learn about conceptualisation, payload integration, thermal testing, and launch preparation.
- **Explore Career Opportunities:** Interact with scientists and engineers to gain insights into career paths in space technology.
- **Observe Technology and Innovation:** Explore advanced facilities like environmental, vibration, and EMC testing labs.
- **Foster Industry–Academia Collaboration:** Promote mutual collaboration between URSC and the Department of Information Science and Engineering to support future research initiatives, internships, and knowledge exchange.
- **Inspire and Motivate:** Encourage students to pursue higher studies and research in premier institutions and contribute to advancements in space technology.

Brief History of U. R. Rao Satellite Centre (URSC) and World Space Week (WSW)

The **U. R. Rao Satellite Centre (URSC)**, formerly known as the **ISRO Satellite Centre (ISAC)**, traces its origins to the early years of India's space programme. Established in **1972** as the **Indian Scientific Satellite Project (ISSP)** at Peenya Industrial Estate, Bengaluru, the centre was founded to design and develop India's first indigenous satellites. Over time, it evolved into ISAC, playing a crucial role in assembling and testing India's early spacecraft for communication, remote sensing, and scientific applications.

On **2 April 2018**, the centre was renamed **U. R. Rao Satellite Centre** in honour of **Dr. Udipi Ramachandra Rao**, the former Chairman of ISRO and founding director of the centre. In the same year, URSC marked a historic milestone by launching its **100th satellite**, which included spacecraft from the INSAT, IRS, and GSAT series. Today, URSC continues to serve as the **backbone of India's satellite programme**, responsible for the design, development, integration, and testing of satellites supporting communication, navigation, meteorology, remote sensing, space science, and interplanetary exploration. The centre also houses specialised facilities such as the **Laboratory for Electro-Optics Systems (LEOS)** and the **ISRO Satellite Integration and Testing Establishment (ISITE)**, further strengthening India's space technology capabilities.

In addition to its technical excellence, URSC actively participates in global outreach initiatives such as **World Space Week (WSW)** — a **United Nations-declared international celebration** of science and technology observed annually from **4 to 10 October**. The UN defines it as “an international celebration of science and technology, and their contribution to the betterment of the human condition.” These dates commemorate two landmark events in space history — the **launch of Sputnik 1 on 4 October 1957** and the **signing of the Outer Space Treaty on 10 October 1967**.

Since its inception in **1999**, World Space Week has grown into the **largest annual space event**, celebrated in over **95 countries** through exhibitions, educational activities, lectures, and competitions. Each year, the **World Space Week Association** announces a global theme — recent examples include “Women in Space” (2021), “Space and Sustainability” (2022), “Space and Entrepreneurship” (2023), “Space & Climate Change” (2024), and “Living in Space” (2025).

The timing of this **industrial visit to URSC in early October** coincided with the World Space Week celebrations, providing students with an opportunity to learn about global space initiatives and witness India’s active role in space exploration. The visit deepened their understanding of how space science and technology contribute to innovation, sustainability, and the advancement of human society.

Detailed Visit Programme and Sessions

Session 1: Satellite Antennas and Orbit Prediction

The team reached the URSC campus at around 9:00 a.m. and, after breakfast, attended the first technical session starting at 9:30 a.m. This session focused on satellite antennas and orbit prediction tools. Engineers introduced different antenna types used for Earth-observing satellites, including **Quadrifilar Helix (QFH) antennas**, **V-dipole antennas**, and **parabolic dish antennas**. They explained the radiation patterns and polarization characteristics of each design and discussed how students could build their own antennas by selecting appropriate materials and components, paying attention to factors such as frequency, gain, and feed-line matching. Participants gained insights into the practical challenges of constructing antennas that provide circular polarization and wide coverage, which are important for receiving signals from **low-Earth-orbit (LEO) satellites**.

The session then shifted to **orbit dynamics and prediction**. Instructors provided an overview of LEO, explaining that satellites in this region circle the Earth at altitudes of a few hundred kilometres and are ideal for high-resolution Earth imaging. They described how satellite images are captured and processed, and outlined various applications of imagery such as weather forecasting, disaster management, and environmental monitoring. A demonstration of orbit prediction software (often used by radio amateurs and weather enthusiasts) showed how **Two-Line Element (TLE) data** can be used to calculate when a satellite will pass overhead. The trainers highlighted **Celes Trak**, a non-profit service offering a comprehensive repository of TLEs, special-interest satellite data, and space situational awareness tools. They explained that Celes Trak’s resources allow users to obtain up-to-date orbital elements for active and defunct satellites, as well as access collision-assessment tools and educational materials.

By the end of the session, students understood how to combine antenna design with orbit-prediction software to plan successful satellite reception and were motivated to experiment with building their own ground-station equipment.

World Space Week 2025 Program and Guest Talks

After the technical antenna session, the delegation joined the **World Space Week (WSW) 2025** inaugural function hosted by URSC. Distinguished guests, including **Professor G. C. Anupama** from the Indian Institute of Astrophysics, **Shri M. Sankaran** (Director of URSC), and **Mr. Velvankar** (senior official), took their places on the dais and opened the formal program.

Introductory talk by Shri M. Sankaran – “Space & Entrepreneurship”

- **Background:** Shri M. Sankaran is a distinguished scientist of ISRO and has served as the Director of the U. R. Rao Satellite Centre since 2021. With a career at ISRO that began in 1986, he has managed diverse projects across spacecraft power systems, radio-frequency communications, navigation satellites and outer-space missions such as Chandrayaan-1, 2 and 3. He is also an expert in miniaturising avionics and indigenising electronics and power system components.
- **Keynote:** In his inaugural address for World Space Week 2023 (the previous WSW edition whose format was followed in 2025), Shri Sankaran spoke on the theme “**Space and Entrepreneurship.**” He highlighted how the growing commercial space sector offers new business opportunities and emphasised that entrepreneurship is essential for unlocking the full potential of space. He drew attention to the expanding **space economy**, which encompasses all public and private actors involved in developing space-enabled products and services, spanning a value-added chain from research and manufacturing to service providers. Shri Sankaran noted that every euro invested in the space industry yields roughly six euros of economic return and that private spaceflight and start-ups are becoming vital partners for government agencies. He encouraged students to consider entrepreneurial ventures and collaborations in satellite manufacturing, ground equipment and launch services, sectors that collectively form the core of the modern space industry.

Guest lecture by Professor G. C. Anupama – “Astronomy as a Driver of Technology and Inspiration”

- **Speaker profile:** Professor G. C. Anupama is a former Dean and Senior Professor at the Indian Institute of Astrophysics (IIA) in Bengaluru and served as the **first woman president** of the Astronomical Society of India from 2019–2022. She is part of the Indian team working on the Thirty Meter Telescope (TMT) and was instrumental in establishing a large optics fabrication facility. As principal investigator, she led the construction of a 0.7 m wide-field robotic telescope at Hanle, Ladakh. Her research focuses on supernovae, transient phenomena and astronomical instrumentation; she has served as editor of the Bulletin of the Astronomical Society of India and Chief Editor of the Journal of Astrophysics and Astronomy. She is also a recipient of the Sir C. V. Raman Young Scientist Award.

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- **Lecture themes:** Professor Anupama’s talk explored astronomy as both a **driver of technology** and a source of **human inspiration**. She explained how cutting-edge astronomical instruments require advances in optics, detectors and data processing, which subsequently benefit other fields such as telecommunications and medical imaging. Drawing on India’s **Aditya-L1 mission**—a solar observatory placed at the Sun–Earth Lagrange point—she described how the mission’s objectives include studying coronal heating, space weather and solar wind. These measurements improve our understanding of the Sun and help mitigate the impact of solar storms on satellites and power grids. She also noted that Aditya-L1 carries seven remote-sensing and in-situ payloads that will provide simultaneous images of the Sun’s photosphere, chromosphere and corona, enabling researchers to trace energy transfer across solar layers. Professor Anupama emphasised that astronomy inspires curiosity and wonder, motivating students to pursue science and contributing to technological progress.
 - **Additional topics:** The lecture also touched upon concepts such as **low-friction astronomical instrumentation** (minimising mechanical resistance in telescope mounts and satellites), the importance of **solar missions** like **Aditya-L1** in understanding space weather, and the broader “**driver of technology**” narrative—how astronomical research accelerates advances in computing, materials and optics.

Demonstrations of Satellite Manufacturing and Testing

Following dinner, students attended an evening session where URSC engineers provided a **live demonstration of satellite manufacturing and testing processes**. The tour began with an overview of how satellites are conceptualised and assembled—from designing the structure and integrating payloads to installing power systems, communications modules and attitude-control units. The engineers explained that once a satellite is fully assembled it must undergo rigorous environmental tests to verify that it can survive the harsh conditions of launch and orbit. For example, **vibration tests** simulate the random and sinusoidal accelerations experienced during launch; these tests are performed on electrodynamic shakers in three orthogonal directions. The primary objective of vibration testing is to build confidence that the spacecraft’s structure, payloads and electrical connectors will withstand launch loads, maintain alignment and continue functioning afterwards. The team noted that similar thermal-vacuum tests expose satellites to extreme temperature cycles and vacuum conditions to verify material integrity and operational reliability in space.

The demonstration area included **scale models and real components** of several ISRO spacecraft. Students saw models of **Aditya-L1**, India’s first solar observatory mission, and learned how the spacecraft will be stationed at the Sun–Earth Lagrange-point L1 to study the solar corona, coronal heating, solar wind and space weather. The guide explained that Aditya-L1 carries seven instruments to capture simultaneous images of the solar photosphere, chromosphere and corona. Displays also featured mock-ups of Chandrayaan-3’s lander and rover, illustrating the systems needed to perform a soft-landing on the lunar surface and conduct in-situ experiments. Using cut-away models, engineers demonstrated how thrusters, propellant tanks and payload compartments are arranged inside the spacecraft bus and discussed the **step-by-step process** from design and assembly to environmental testing and launch integration. Students were shown a

rocket-launch simulation, which explained how satellites are encapsulated in payload fairings, mounted on launch vehicles and deployed into orbit. Throughout the session, presenters emphasised the importance of careful verification—through vibration, thermal-vacuum and acoustic testing—to ensure mission success. The hands-on demonstrations and expert commentary gave participants a clear picture of the complex engineering and quality assurance practices that underpin India’s space missions.

Conclusion

The industrial visit to the **U. R. Rao Satellite Centre (URSC), ISRO, Bengaluru**, was an enriching and insightful experience that successfully bridged the gap between theoretical learning and real-world space technology applications. Through interactive sessions, live demonstrations, and expert lectures, students gained a deeper understanding of satellite design, antenna systems, orbit prediction, environmental testing, and the overall workflow involved in spacecraft development.

The visit also coincided with the **World Space Week 2025** celebrations, offering participants a unique opportunity to engage with eminent scientists and visionaries such as **Shri M. Sankaran**, Director of URSC, and **Professor G. C. Anupama** from the Indian Institute of Astrophysics. Their inspiring talks on “Space and Entrepreneurship” and “Astronomy as a Driver of Technology and Inspiration” broadened students’ perspectives on how space science contributes to innovation, sustainability, and societal advancement.

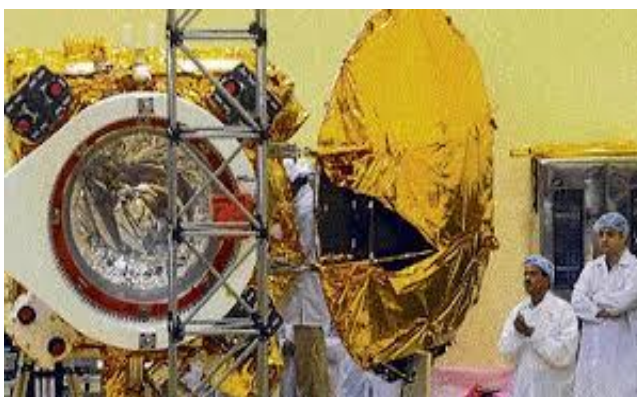
Overall, the visit provided students with valuable technical exposure and motivated them to explore higher education, research, and entrepreneurial opportunities in the field of space technology. It fostered curiosity, teamwork, and scientific temper among participants while highlighting India’s growing capabilities in satellite design, interplanetary exploration, and commercial space applications.

The visit proved to be **both educational and inspirational**, motivating students to pursue **higher studies, research, and careers** in fields such as **aerospace engineering, artificial intelligence, robotics, and data analytics** — domains that increasingly support modern space exploration. It also instilled a sense of pride and responsibility among students to contribute meaningfully to India’s growing role in global space science and technology.

The Department of Information Science and Engineering expresses sincere gratitude to **URSC–ISRO** officials for their guidance and hospitality, and to the **IEEE Computer Society Student Chapter, JNNCE**, for organizing this educationally transformative experience. Such visits play a crucial role in inspiring future engineers to contribute meaningfully to the nation’s scientific and technological progress.

Glimpses of the visit to U. R. Rao Satellite Centre (URSC), ISRO, Bengaluru.







Budget and Expenditure Details:

Industrial Visit Budget Details

The Department of Information Science and Engineering (ISE) organized an industrial visit to the U. R. Rao Satellite Centre (URSC), ISRO, Bengaluru for final-year students on 4th October 2025.

The list of students participated in the industrial visit Mentioned Below:

Student Name	Student USN	Student Phone Number	Student Aadhar Number	Amount Paid
Abhitha B S	4JN22IS008	8147933083	526459308471	1000
Akash A	4JN23IS401	8073243817	456822039014	1000
Amrutha H	4JN22IS020	8660592579	948490022674	1000
Amrutha K M	4JN22IS021	7483852096	711305362106	1000
Ananya T Y	4JN22IS026	7483494592	692558443757	1000
Ankitha G	4JN22IS029	9353717006	236488811723	1000
ANUSHA U S	4JN22IS030	8867143907	862614572680	1000
Anushree D M	4JN22IS031	9113906590	452432917880	1000
Apeksha KA	4JN22IS032	9972353045	616308763895	1000
Ashwija D	4JN23IS402	7411272815	433700209901	1000
Bhoomika D	4JN22IS039	8317415878	415326692722	1000
Bhoomika MD	4JN22IS041	7019723113	560429309397	1000
Chaithra R	4JN22IS044	6362496066	266405227854	1000
Chandrashekar R	4JN22IS047	6366189346	691848919726	1000
Chethan kumar v	4JN22IS048	6364132130	675299954899	1000
Chinmai PS	4JN22IS049	6363701998	707255333166	1000
Harshitha M Reval	4JN22IS066	9108458604	386729794225	1000
Manu.M	4JN22IS087	7676251018	960192264364	1000
Manvitha N Rao	4JN22IS088	8073932997	495466705861	1000
Megharaj shet	4JN22IS089	6363101049	531916021297	1000
Nagapriya K S	4JN22IS097	8867480549	783475941042	1000
Purvika S Rao	4JN23IS102	9538382782	905597596524	1000
S S Varaprasad	4JN22IS125	9686756532	329807598196	1000
Sahana Chandrakant Naik	4JN22IS127	6360469542	203283827850	1000
Sanjay M	4JN22IS130	9900903409	279963522693	1000
Santhosh T	4JN22IS131	8660757568	714549880967	1000
Sathwik M C	4JN22IS133	9945847270	351351677363	1000
Shreyas R	4JN22IS139	8088015080	615435543072	1000
Shruthi Hiremath	4JN22IS140	8310808916	662769526215	1000
Sindhu V B	4JN22IS145	6361015750	699246364841	1000
Siri CK	4JN22IS146	9972269790	249000812683	1000
Sneha B	4JN22IS147	7204974891	706131760572	1000
Sowjanya MU	4JN22IS148	6361542184	572173186505	1000
Spoorthi B	4JN22IS150	9353142664	451973009730	1000
Subramanya S Gujjar	4JN22IS154	7019042622	618123066519	1000

Tarun D R	4JN22IS163	6363599690	400334282482	1000
Tarun s	4JN22IS164	7483290724	820927772734	1000
TILAK S	4JN22IS168	9844651975	698064875691	1000
Vaibhav Rao BN	4JN22IS170	9480899295	475952201423	1000
Vaishnavi S V	4JN22IS171	7483967699	590833754733	1000
Vanyashree R Naik	4JN22IS175	7676504758	460943651743	1000
Vidhathri Udupa	4JN22IS180	8762614497	951104624646	1000
Vijay	4JN23IS417	7795136312	845603520018	1000
Vikyath M A	4JN22IS181	9036446159	891431837702	1000
Viresha H T	4JN22IS183	6361217163	906121118911	1000
Yashaswini B M	4JN22IS185	7204779552	243553482905	1000
Yuvaraj M R	4JN22IS187	9353370948	235446164151	1000
Total				47000

The list of faculties participated in the industrial visit Mentioned Below:


Faculty Name	Amount paid
Dr. Pavan Kumar M P	1000
Dr. Chetan G S	1000
Mr. Arun Kumar P	1000
Mr. Anil Kumar	1000
Total	4000

Total amount collected from both students and faculties is **51000 rupees**.


To make the event successful, the following **budget expenditure** was prepared below:


for Transportation	31000 + 3000 + 2500 + 100	36600
Breakfast	3000 + 150	3150
Dinner	9500 + 200 + 200	9900
Banner	400	400
Pooja items and petrol	100 + 30	130
Total		50180

Bills of all payment:


**Transaction Successful**
01:31 AM on 05 Oct 2025



Paid to


**SHAAN PETROLEUM 2** ₹5,000
DIESEL
Q669345024@ybl

 **Payment details** ^


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**Transaction Successful**
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Paid to



**Veeresh H T JNN Ise** ₹200
+916361217163


Banking Name : Viresha H T ✓

 **Transfer Details** ^


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**Transaction Successful**
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Paid to



**Veeresh H T JNN Ise** ₹200
+916361217163


Banking Name : Viresha H T ✓

 **Transfer Details** ^


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**Transaction Successful**
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Paid to



**Bus Driver Arun Snake** ₹150
arunaruaa77@okicici

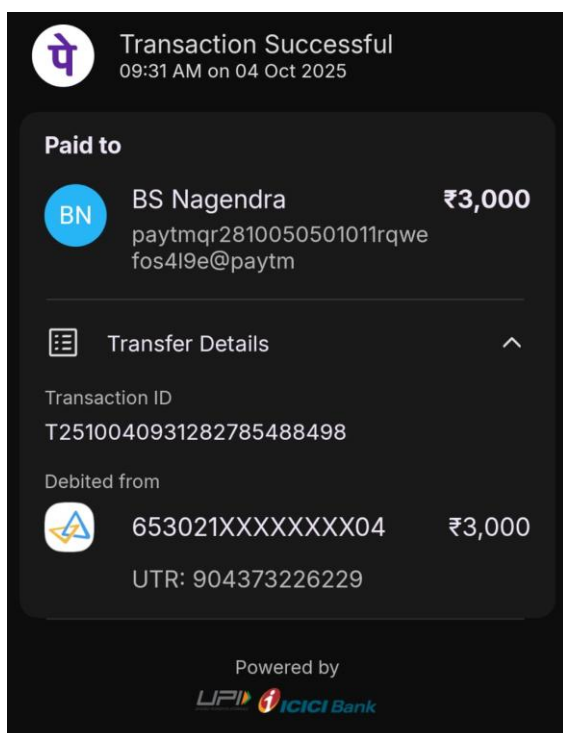
Sent to :  **G Pay** • arunaruaa77@okicici

 **Transfer Details** ^

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Anand Bihar Hotel-2			
Family Restorent			
Near Jos Toll Gate, Bangalore-Tumkur Road, Tumkur			
No.:	Date:		
Particulars	Qty.	Rate	Amount
Dal Fry	18	155	2790
T. Roli	55	25	1375
VeJ Biyani	27	190	5130
Water	17	20	340
Total			9635

Mr. Viresha H T

Chair, IEEE CS
Student Chapter

Dr. Pavan Kumar MP

Associate Professor and
Industrial Trip
Coordinator Dept., of
IS&E JNNCE

Dr. Raghavendra R J

Head of the Dept.
IS&E, JNNCE

Dr. Y. Vijaya Kumar

Principal, JNNCE

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