

# EDGE of SPACE

Monthly Digital Newsletter

VOL. 1 • ISSUE 1 • FEB 2021

From the News

## Mars Rover Mission 2020: Things you need to know

BY PRIYANKA KASTURIA

2:31 a.m. Feb 19, 2021, a tweet by NASA's Perseverance Mars Rover, "Hello, world. My first look at my forever home." NASA and the world celebrated the success of the landing of Mars Rover "Perseverance" on the Mars' landing site called Jezero Crater, one of the eight potential locations to explore Martian life.

One of the missions is to "search for ancient life by collecting rock samples and sending them back to the Earth." The rover is itself a mini-scientific laboratory on Mars to collect thirty-eight rock samples, and testing experiments for various purposes.

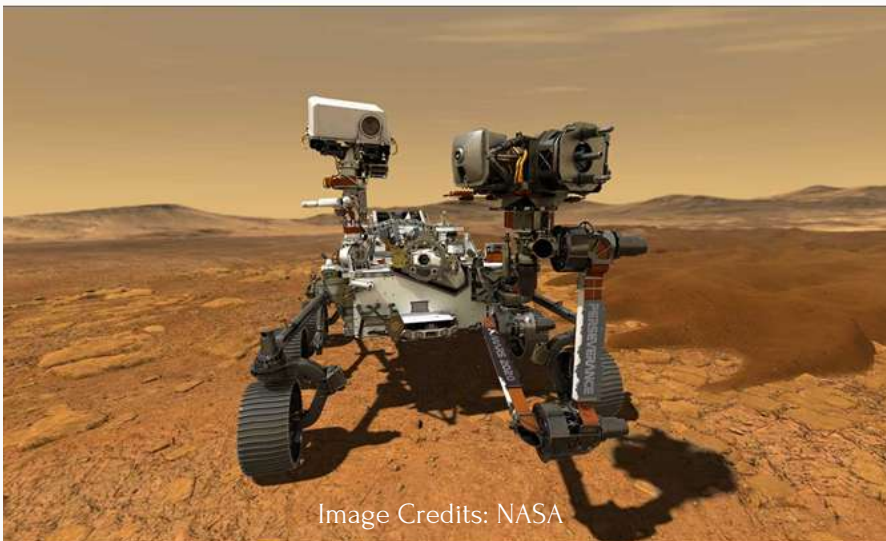


Image Credits: NASA

READ MORE AT: [Mars Rover Mission 2020: Things you need to know](#)

## This issue:

From the news  
Mars Rover Mission 2020:  
Things you need to know  
PAGE 01

Blog of the Month  
Space Robotics: Leading  
the way to the cosmos  
PAGE 02

The News Bulletin  
PAGE 07

SSERD Celebrates  
National Science Day  
PAGE 08

Internship and Projects  
Division (IPD) - Batch 8  
PAGE 10

Blog of the Month

# Space Robotics: Leading the way to the Cosmos

BY K SHREYAS SUVARNA

The space tech industry has been largely dependent on automation right from the very beginning and now with advanced technological know-how, this dependence is bound to increase exponentially, and it's robotics that steps in to assist humans in exploring the unknown.

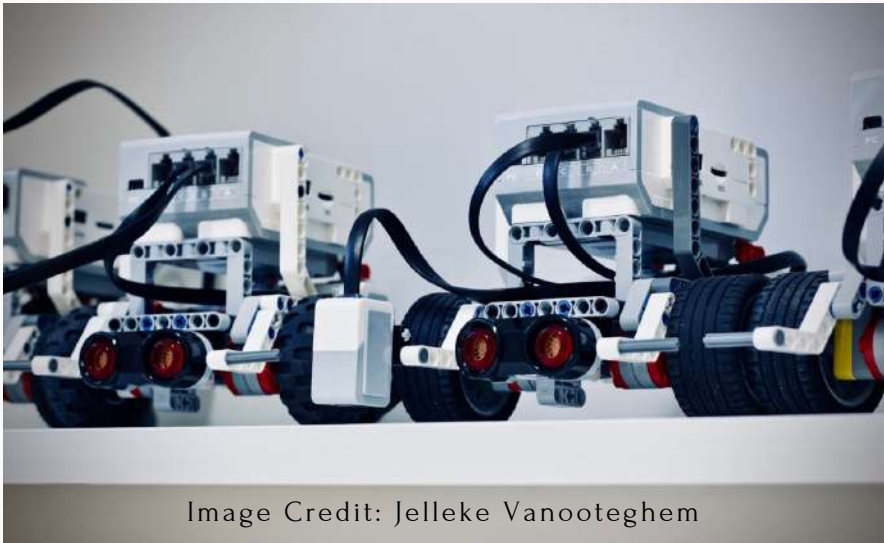


Image Credit: Jelleke Vanooteghem

When the ISRO Inertial Systems Unit (IISU) unveiled the 'VyomMitra', an AI-powered humanoid robot in January 2020, with the intention of assisting the first Vyomanauts to space under the Gaganyaan Mission, many people were awestruck by her capabilities.

'VyomMitra' is just one of the many space-faring robots specifically designed to provide assistance, both technical and psychological, to astronauts who stay in isolation for long durations. Another famous example is the JAXA 'Kirobo', which has a Toyota developed facial recognition software and language processing technology and was launched into space way back in 2013.

**"The future, despite being seemingly 'unpredictable', is definitely 'exciting' and most possibly, realize the dream of mankind of being an 'interplanetary species'."**

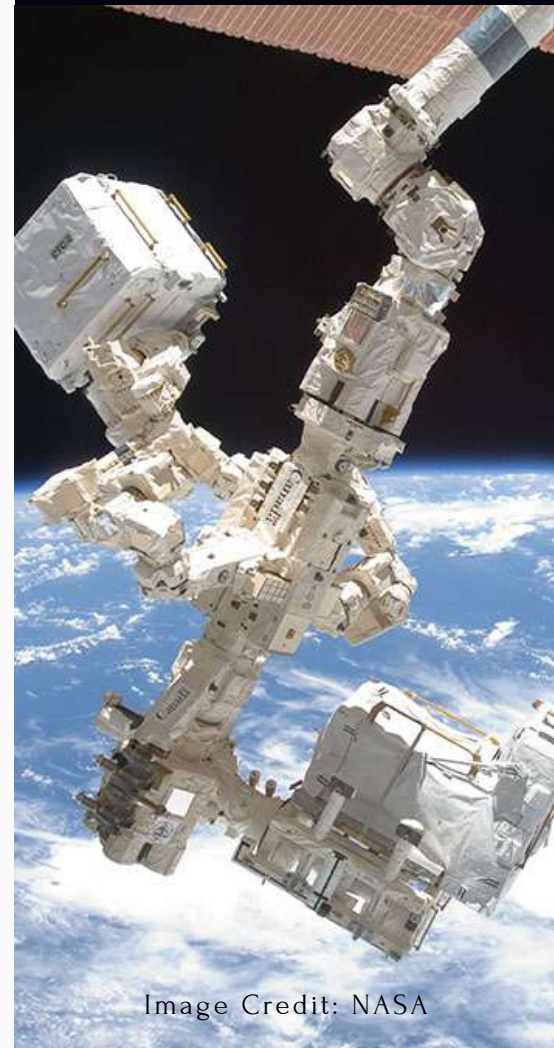


Image Credit: NASA

## The buzz around Robotics:

The word 'Robot' is derived from the word 'Robota', meaning 'Forced Labour'. Despite efforts by Ford and other pioneers against the use of this term, the name clung on, and only became more and more popular over the years.

The study of 'Robotics' commonly falls under the domain of 'Mechatronics', which is the confluence of Mechanical, Electronics, and Computer Science Engineering domains

The primary intention of robots was to replace humans in hazardous workplace environments and performing routine, mundane tasks that were thought of as 'too boring' for humans.

Modern-day robots are highly flexible and with the advent of Artificial Intelligence and the Internet of Things, their capabilities are set to reach new heights.

The use of robots has improved safety, speed, consistency, and quality resulting in enhanced productivity and healthy happy, workplaces.

Terrestrially, robots have been used extensively in welding and painting processes, which pose a huge risk to human lives due to the noxious fumes and heat. They are also used for other mundane and repetitive processes such as assembly, material handling, and pick and place operations at industrial setups.

With the advancement in technology, robots are now being used extensively in health-care for both diagnosis and treatment, disaster management, surveillance, and even in the military for a wide variety of applications such as target acquisition, clearing landmines, and automatic weapon systems.

The need for 'Space Robotics' was envisioned even before mankind's first venture into space, namely the 'Sputnik'. Pioneers and authors like Isaac Asimov and Jules Verne penned down vivid descriptions of highly sophisticated and advanced space-faring vehicles with a significant level of automation. In fact, Isaac Asimov is credited with chalking out the three laws of robotics which are at the very foundation of robotics.

**"The future, despite being seemingly 'unpredictable', is definitely 'exciting' and most possibly, realize the dream of mankind of being an 'interplanetary species'."**



Isaac Asimov:  
Proponent of the Laws of Robotics

Image Credit: Getty images



The three laws are:

Law 1: A robot may not injure a human being or through inaction, allows a human being to come to harm.

Law 2: A robot must obey all orders by human beings unless it conflicts with the first law.

Law 3: A robot must protect its own existence as long as it does not contradict the above two laws.

As said by Daniel H. Wilson, the New York Times best-selling author and a robotics engineer himself, “There is an endless number of things to discover about robotics. A lot of it is just too fantastic for people to believe.”

## Space Robotics and its history:

Space is still a mystery in the eyes of humans. Despite years of study by observation and with over six decades of extensive ‘space exploration’, most of the cosmos is still unknown.

According to estimates, scientists have only been able to explore 4% of the visible universe, with the rest of the universe still lying unexplored.

Hazards associated with manned missions, such as prolonged exposure to high radiation, isolation, and confinement and the significantly large distances from the earth in a hostile environment pose a huge technical and logistical challenge.

Hence, ‘Space Robotics’ proves to be a viable alternative to manned missions. Robots can continuously carry out operations in a hostile environment while minimizing or eliminating risk to human beings completely. They can be monitored from significantly large distances and work at significantly higher speeds when compared to their human counterparts.



The history of ‘Space Robotics’ begins right from the beginning of space exploration. One of the most prominent of the initial robotic missions was the ‘Surveyor’ series of spacecraft sent to the moon between 1966 to 1968, the inputs of which played a prominent role in planning the ‘Apollo’ series of manned missions to the moon. Another important mission was the ‘Lunokhod 1’ – the first mobile robot to explore the extraterrestrial surface of the moon, which touched down on the moon’s surface in 1970.

Not only did these missions provide a significant amount of scientific data, but they also reaffirmed the capabilities and potential of robots in space exploration.

This led to an increasing number of robotic missions, which not only improved the quality and quantity of scientific data but also increased access to space.

Robotics has enabled missions such as the ‘Rosetta Space Probe’, the ‘Voyager’ series of missions, the ‘Chandrayaan’ series, and rover missions such as the ‘Curiosity’ and ‘Perseverance’.

Apart from this, robots have also been used to assist astronauts and perform multiple functions such as repair, pick and place operations, maintenance, and fault identification, and also psychological support.

Today we have three major classifications of 'Space Robots': Remotely Operated Vehicles (ROV), Remote Manipulator Systems (RMS), and Auxiliary Support Systems, performing a large variety of tasks carrying out both scientific and routine activities.

With great reliability and capability, robots are sure companions on this journey of exploring the unknown, and with time, this bond is only going to get stronger.

## A Peek into the future:



Doraemon: Fujiko Fujio's visualization of the future (Image Credits: pixabay.com)

Given the pace at which technology is growing, it is quite difficult to predict how the future will be and how robots from the future will look like. People have vividly imagined our shared future with robots, with 'Doraemon': a robotic cat of the 22nd century created by Fujiko Fujio and 'Archos R-14': the villain of 'Robopocalypse', being on the two extreme ends of the spectrum.

Some futuristic applications of robotics include Space Drones, Humanoid Robonauts, Augmented Reality, Cyborgs, and Self-Replicating robots.

Space Drones are one of the most ambitious applications of space robotics. These can hover over an area and provide 24 X 7 communication with entities such as rovers which are now susceptible to 'communication blackouts'. Apart from this, the 'Space Drones' can be used extensively for imaging purposes and will provide better insight into the surface structure of other planets.



As for Humanoid Robonauts, they are already in place for several years now in terrestrial applications but with robots such as 'Kirobo' and 'VyomMitra', their domain has only expanded. NASA's 'Robonaut' series is capable of handling tools and equipment just like humans, and their capabilities are seeing significant improvement over time. Soon, there will be a day when robots will be co-passengers with humans aboard the same spacecraft.

Augmented Reality can be an alternative to sending humans to other planets. Technologies such as holograms can be utilized to explore the surfaces of planets providing valuable scientific input to scientists. This data can be used for planning future manned missions to other planets.

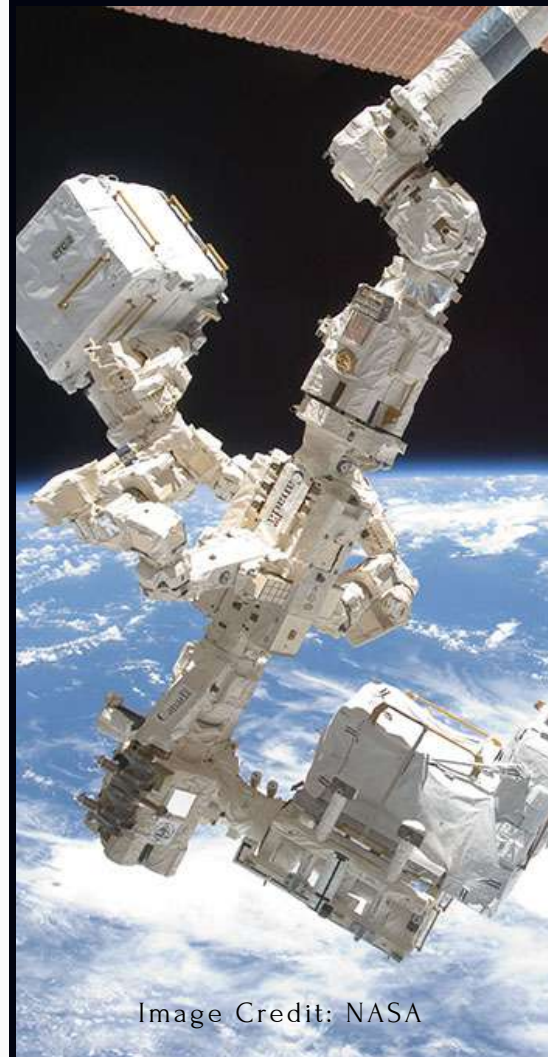


Cyborgs essentially mean, integrating organisms and robots. These can help humans overcome their biological weaknesses and obtain extended capabilities. Elon Musk's 'Neuralink' is one such venture, which aims to fuse humans and Artificial Intelligence.

Self-Replicating Robots are those robots capable of replicating themselves autonomously using raw materials in the environment. These can prove to be quite valuable in setting up human settlements on other planets. These settlements can be used as 'Operations Base' or 'Transit Stations', for future exploration.

Apart from these applications, there are an infinite variety of technologies under development that will revolutionize the way we think of the term 'Space Exploration'. The applications of these technologies are not only limited to space but the 'spin-offs', which can be used to improve the quality of life of people around the globe.

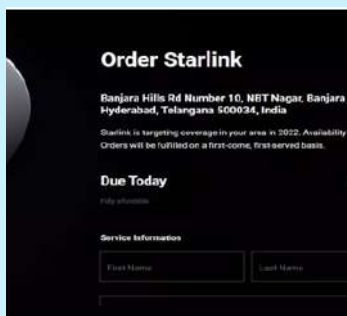
**"The future, despite being seemingly 'unpredictable', is definitely 'exciting' and most possibly, realize the dream of mankind of being an 'interplanetary species'."**



# THE NEWS BULLETIN

1

Starlink Elon musk's satellite internet service is coming to India in 2022. The goal is to create wireless and superfast internet connections worldwide. Starlinks has started pre-bookings in India at \$99 (approx ₹7,300). Starlink is offering speeds between 50-150 Mbps. It is to be estimated that speed will be doubled to 300 Mbps by the end of 2021.



2

Rocket Lab unveiled plans for its 'Neutron' reusable rocket, a complicated eight-ton payload class launch vehicle tailored for interplanetary missions and human spaceflight. Neutron will build on Rocket Lab's "proven experience" developing the reliable workhouse "Electron" launch vehicle. Jeff Bezo's Blue origin delays launch of New Glenn rocket to 2022



3

World's richest person, Jeff Bezos, led space agency Blue origin, has delayed the launch of the maiden New Glenn rocket to the fourth quarter of 2022. The delay comes after the US space force's decision not to choose Blue origin for a national security launch contract. Bezos recently announced he'll be retiring from Amazon and focusing on projects like Blue Origin.



## PSLV C51 LAUNCH

BY HARDIK KUMAR MAHAJAN & BANDARU UMAMADHURI

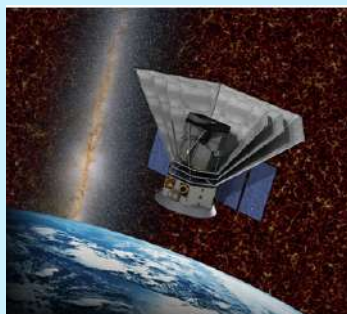
The Indian Space Research Organization (ISRO) has started 2021 on a high note with its launch of PSLV C-51 on February 28, 2021, at 10:24 hours (IST) with primary/main payload of Amazônia-1 and 18 co-passenger satellites. It was the 53rd mission of the Polar Satellite Launch Vehicle (PSLV).

Read more at "[PSLV C51 Launch](#)"



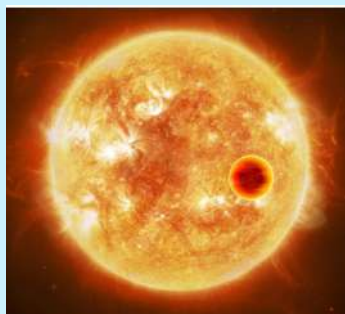
4

For SPHEREx mission, which is a two-year planned astrophysics mission to explore the sky in near-infrared light to provide insights into the cosmos, NASA selected SpaceX's Space Exploration technology of Hawthorne, California. SpaceX will be providing the launch service via Falcon 9 rocket from Space Launch Complex-4E. The launch is currently planned for June 2024.



5

According to the recent publication in the journal Astronomy & Astrophysics, 3rd Feb 2021, astronomers detected Chromium Hydride as evidence for a substance on exoplanet WASP-31b (Hot Jupiter), having temperature and pressure at a boundary between liquid and gas. The team plans to use James Webb Space Telescope (JWST) for further investigation.



6

For the first time, astronomers developed an accurate method for the determination of the surface temperature of red supergiants, which are the ones, who end themselves in becoming supernovae explosions. It will help them to understand the life cycle of stars. You can check out the "[University of Tokyo](#)" and "[Science Daily](#)" for more information.





REGISTER NOW !!!

## SSERD Celebrates NATIONAL SCIENCE DAY

On 28th February 2021, National Science Day was organized by the Society for Space Education, Research, and Development to commemorate the discovery of the Raman Effect by Sir Chandrashekara Venkata Raman. Due to the pandemic, this event was featured live on YouTube at 4:00 pm IST. The theme for this event was the Future of STI: Impacts on Education Skills and Work. The undergraduates and High school students were the centers of the event.

### DEAR SCIENTISTS CAMPAIGN

From Newton to Mendeleev to Einstein to Curie to Penrose, each and every scientist has made remarkable discoveries that contributed to the whole universe-some.

To thank them, we organized the 'Dear Scientist campaign'. In this campaign, not only students but every person who wants to show gratitude towards the scientists, who do an unlimited amount of work selflessly, were allowed to write a letter to either their favorite scientist(s) or the whole scientific community. Regularly, many videos and posters were posted on different social media platforms. As the word went around, students, adults, workers, and many others sent letters at SSERD.

We got an overwhelming response from people, especially from middle school and high school students. Not just that, even small children who have just learned how to write a letter, sent one with the help of their parents and teachers and not only from India, but other countries, like the United Arab Emirates.

## KEY HIGHLIGHTS

Dear Scientist: A Letter-Writing Campaign



Jijñāsā: Virtual Science Exhibition



Anveshna: Research Poster Presentation.



“

*I personally like the idea of a Virtual Science Fair and by this concept I was encouraged to participate. I enjoyed doing the science experiment and showing it to people. And I am also really happy that I have secured this position. So I am really Overjoyed!!*

feedback from a participant



## JIJNASA

Curiosity is the first step towards knowledge. The 'Jijnasa' aims to nurture curiosity towards science among young students. This National Science Day, we brought works of students from Middle School and High School through a virtual science exhibition. In which students exhibited some kinds of science things.

Jijnasa was a two-day virtual science fair held from 27th-28th Feb 2021 where we had students from middle school and high school who presented their mind-blowing experiments online itself. It was a competition with opportunities opened to present their science skills of experiments and presentation.

Virtual science fair- "jijnasa" was held online through SSERD NSD(national science day) website. The website consisted of stalls in which pre-recorded experiments were uploaded.

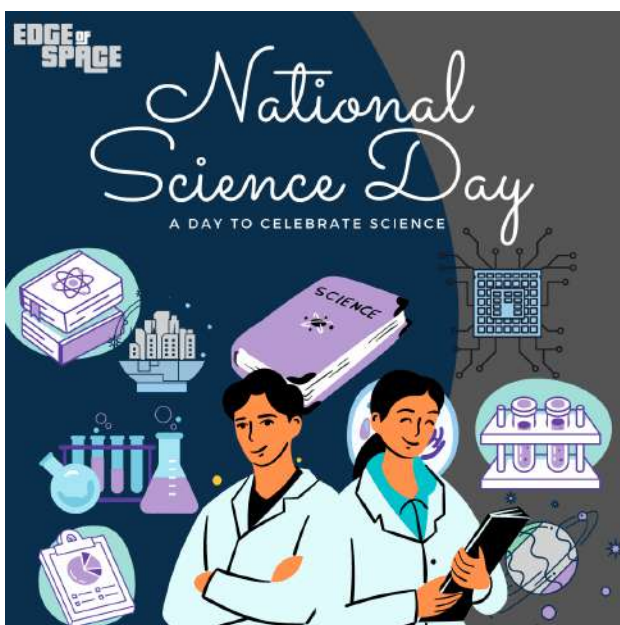
Experiments were performed in groups and individuals. A week of work went under confirming registrations and collecting the deliverables and uploaded into stalls. Each stall had a quires section and voting poll. Based on the votes received winner of the competition was declared.

## ANVESHANA

The top 4 entries which presented their research posters during Anveshna were

- P1. The Digital Stethoscope by Anurag Nag Adoni and Bishal Banerjee
- P2. Role of a misfire on muscle Maintainance in adult Drosophila by Varsha H J et.al
- P3. Ensemble Boost ML model for prediction of Solar Flare Index of Solar Flares by Adhitya Shreyas
- P4. Testing of hypothesis- An Inverse correlation exists between Sunspot Area and Solar Activity parameters by Anisha Rastogi.

During the live session, questions were dropped in the comment box and answered by the presenters. A vote of thanks leads us towards the end of the successful event.



---

*The excitement for science should not be for one day. It is a fluid framework of thinking and reasoning about information.*

---

Read our blog on [National Science Day](#) at [Edge of Space](#)

# INTERNSHIP AND PROJECT DIVISION - BATCH 8

The goal of this internship is to help students to work on space-related projects! You will receive the best of training and guidance from SSERD as well as other pioneers in the field all to your home and completely online. You will also earn an e-certificate after the completion of the internship.

## TOPICS:

1. Propulsion System
2. Astronomy and Astrophysics
3. Satellites
4. Space Settlement
5. Space Mission Design
6. Space Robotics
7. SSERD Operations

## BENEFITS:

1. Training
2. SSERD official membership
3. Career guidance
4. Access to professionals
5. Scholarships will be provided for those who can't afford

## TRAINING ON:

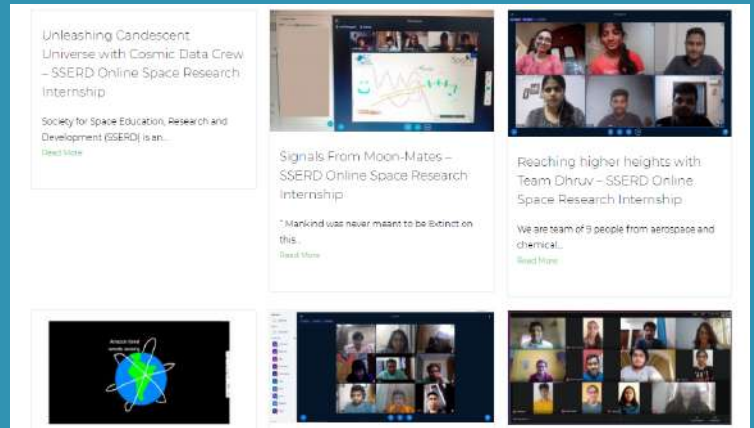
1. How to do the research
2. How to look for the correct information
3. How to make the best resume
4. Selection of universities
5. Project Specific Trainings

Application is open for any students pursuing undergraduate and postgraduate programs.

## Application Process:

1. Fill the application form
2. Wait for interview notification
3. Issue of topics
4. Commencement of Internship

Batch Duration: 22nd March – 26th April  
Timings: 4-8 PM IST, Monday to Saturday  
Last Date to apply: 13th March 2021



Visit [SSERD Internships](https://www.sserd.org/interhips) to know more

A monthly digital newsletter by Edge of Space  
Follow us on our social media handles for more updates



[edgeofspacein](https://www.instagram.com/edgeofspacein) [edgeofspacein](https://www.facebook.com/edgeofspacein) [edgeofspacein](https://twitter.com/edgeofspacein)

Visit [www.edgeofspace.in](https://www.edgeofspace.in) to read interesting blogs



Fill out the [google form](#) to contribute

Also, Follow SSERD on social media for more updates.



[sserd\\_org](https://www.instagram.com/sserd_org)



[sserd.org](https://www.facebook.com/sserd.org)



[sserd\\_org](https://twitter.com/sserd_org)



[sserd](https://www.linkedin.com/company/sserd)



[sserd](https://www.youtube.com/channel/UCsserd)

visit [www.sserd.org](https://www.sserd.org) for more information