

VIGYAN PRASAR

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AUTISM SPECTRUM
DISORDER:
A NEURODEVELOPMENT
DISORDER

DR HASHIMA HASAN:
A SCIENTIST'S JOURNEY
FROM AMU TO NASA

BIZARRE HABITS
OF GENIUSES

VIGYAN SARVATRA
PUJYATE

EARTH DAY
INVEST IN
OUR PLANET



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MY WORD

NAKUL PARASHAR

**Into a new era,
a new year****IT IS ALWAYS**

a pleasure to find things returning to the old normal. Thanks to the massive vaccination drive that our government initiated and implemented and the booster shots that are being promoted now. Well, news about recent surges and new variants of Coronavirus from China and Korea prompt us to get ready, as this part of the year for the past two years have left behind irremovable scars with most of us—*deja vu*. Thus, time to be cautious and alert. So, don't disown wearing masks, don't stop washing hands, and don't do away with maintaining social distance. It's for our good and, therefore, enhances the practice of basic hygiene-related etiquettes. Keep an eye on COVID-related information, and if possible, provide the relevant yet fully correct information in your surroundings. That is the real power of science communication. Stay safe; that's all that each of us can convey minimally.

Indeed, time is changing with the change in weather. This year, there has been a sudden rise in the daily temperatures, unlike the past two years. Equinox occurred on March 22. This marked the new year as per the Indian calendar, the start of saka 1944. Way back in 1952, the famous Indian astrophysicist Dr Meghnad Saha formed a committee called the Calendar Reform Committee. The Committee was... "to examine all the existing calendars which are being followed, in the country and after a scientific study of the subject, submit proposals for an accurate and uniform calendar for the whole of India." It got us the unified Indian calendar with exciting information about various calendars that existed in different parts of the country. Interestingly, while April 2 would witness Gudi Padwa, Ugadi, Chaitra Pratipada and many more, new year in several parts of the country, an appropriate website

has come up—<http://bharatcalendar.in/>. Full of information, this website would take the visitor to a forthcoming two-day conference in Dongla, a place near Ujjain on the Tropic of Cancer on Indian National Calendar. No to be missed!

For us at Vigyan Prasar, the new financial year brings much promise in the domain of SCoPE with unique projects and events. Several projects have been set aside for the weaker sections of the society, especially the scheduled tribes. With partners in Madhya Pradesh and West Bengal, we shall be launching many projects on content creation and product development in SCoPE for the ST masses' benefit. This again would be in languages that are spoken in these areas. Dream 2047 has been serving its readers for a very long time. The current format of the newsletter requires change. It requires space so that more articles can be accommodated in time. Stay tuned for the exciting changes. Similarly, on the Indian languages' front, we are ready with Dogri and Punjabi to be included in our list of SCoPE-in-Indian Languages. Odiya, Malayalam, and Nepali would be next in the queue, in this financial year for sure. Another important aspect of communication in our country is theatre. We are gung-ho about adding SCoPE-through-Theatre. For this, several groups have put up proposals with us to bring forth the nation's first science theatre festival.

Indeed a lot more in the time to come, but only one note that we will make efforts to stay safe and maintain the COVID protocol.

Happy Ugadi, Gudi Padwa, Chaitra Pratipada, and much more!

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COVER STORY

GEETHA IYER



EARTH DAY **INVEST IN OUR PLANET**

As 22 April approaches, one begins to hear about a number of activities that can contribute to healing our planet's ill health. How much do we sustain these activities after this day has passed is a question to ponder.



Human beings have a way of forgetting that these actions need to be continued, like daily exercises that keep our body healthy. If we reflected upon how and why did this day come to be and what it has managed to achieve, then we might remember to continue some of these activities. The historical knowledge is essential to keep these healing activities alive lest they remain a symbolic one for designated days. How did Earth day also known as International Mother Earth Day, celebrated every year on 22 April come about?

HISTORY OF EARTH DAY

When the air in your city turns foul, citizens can approach the courts with complaints and force governments to take action to reduce air pollution. If the water coming in your taps turns unpotable, you can take recourse to law for access to clean drinking water. The regulatory mechanisms like Clean Air Act or Clean water Act were non-existent in as late as 1970s. Years of foul air, poisoned water, and unfertile soil since the industrial revolution set in had slowly turned the planet unhealthy. The deteriorating situation of our planet, invisible to us, but not to scientists, had the United States Public Health Service organize a symposium, titled Human Ecology Symposium, in 1968. They invited students to listen to scientists talk about the deteriorating aspects of our environment and its impact on human health.

On 22 April 1970, Wisconsin Senator Gaylord Nelson, an ardent environmentalist, organized a massive protest across several states of America to demand the creation of a National Environment Protection Agency. The date was selected in part because it fell between colleges' spring break and final exams, and also from the observance of Arbor Day, which began in Nebraska in 1872, a day when people are encouraged to plant trees. Thousands of students from universities, schools, and people from communities across America came out in support

of this demand. It is said that nearly 20 million Americans participated to show their solidarity. It produced the desired results. In December the same year, the US government set up a new federal agency-U.S. Environmental Protection Agency-to tackle problems of the environment. Along with setting up the Agency, the first of the legal protection system, Clean Air Act was passed. The protest date came to be known as the Earth Day. Since its inception, this day is celebrated with events that help reawaken-in the minds of those who have taken their life for granted-that protecting the Earth and keeping our planet healthy is our duty. It can be compared to the Indian way of life, where we consider taking care of our mother to be an expression of our love and duty. Mother Earth needs our love and care, Earth Day is a reminder of that.

GLOBAL EVENT

Although in practice since 1970, Earth Day became a global event only in 1990. In the twenty years since its inception, awareness about the deteriorating environment had become universal as the effects became more perceptible vis-à-vis human health. The United National Environment Programme (UNEP) set up in 1972 was active globally and its alliances with institutions like the WWF and other agencies helped spread the word across countries. So in 1990, Earth day came to be celebrated in 140 countries. With 193 countries taking part in Earth Day celebrations, today it's a global phenomenon and a firm reminder of our responsibility to our Planet Earth. Every year there is a theme to celebrate this day. This year it is "Invest in our planet".

SOCIAL SIGNIFICANCE OF EARTH DAY

In a calendar year there are several days designated to raise awareness about the state of our environment such as the world wetland day, world habitat day, etc. But Earth day was the pioneer that paved the way for establishment of all



(Source: <https://www.earthday.org/>)



(Source: <https://www.earthday.org/>)

these days. It raised awareness about the close links between humans and earth. This day, a reminder to humanity about its role in preserving Earth and her other life forms, has brought about environmental movements among all communities of people across the globe. It has transformed the way we perceive, use, and keep a watch on the resources our planet provides us with. It brought about processes of protection; for example, the harm caused by plastics and therefore the principles of reduce, reuse, and recycle has now gained acceptance in our society. Could we have imagined this in 1960s when plastics were welcomed with both arms! Similarly, there is now greater compassion towards other living beings. Humans are increasingly becoming sensitive towards the ways by which animals are used for entertainment and a ban on using animals to entertain has been possible. The successful legislations Earth Day could bring about have boosted the confidence of people to take on large private or public organisations to tackle issues related to pollution. There has been a social transformation that is continuing to evolve and resolve environmental problems facing the globe. This is a very significant achievement in our society. Earth day has ignited different kinds of revolutions in the field of environment and created partnerships between business houses and citizens in

a manner that was unimaginable in the 19th century or even in the first half of 20th Century.

EARTH DAY AND SCIENCE

Science and Earth Day are closely and naturally linked. The evidence provided by scientists through their research on the negative impacts of pollutants on human health, the effects of untreated effluents from factories into water bodies, the ultraviolet rays reaching Earth through depleted ozone, etc. in the atmosphere gave environmentalists like Senator Nelson and citizens around the world the evidence they needed to demand action from Governments and erring citizens. Sustained and dedicated work from the scientific world has helped create awareness of the various ills that have overtaken the planet Earth. It was a citizen's demonstration based on scientific facts that led to the declaration of Earth day. Now, each year the Earth Day helps bring to the fore the discoveries from the world of science on the state of our environment and the solutions that are possible. The themes to celebrate this day each year are based on the discoveries from the world of science; the themes set into motion several activities that enlighten humans about the measures that can be taken to keep the planet healthy. Earth Hour was an extension of a



Roughly 20,000 elephants are killed each year in Africa. UN Environment. (Source: <https://www.earthday.org/>)

kind. It was possible to convince citizens that switching off lights even for a few minutes can save massive quantities of electrical energy, in turn protecting resources used to generate electricity. Science has a major role in understanding natural processes, providing data and information for conferences, and setting up meaningful projects for conservation. One of the fairly successful effects of science has been The Montreal Protocol, geared towards replacing substances that cause the ozone layer in the atmosphere to deplete and form Ozone holes.

IMPACT ON ENVIRONMENT

Despite legislation brought about by establishing the Earth Day, actions that lead to the degradation of environment were still commonplace. In 1971 six members of the Greenpeace organized a protest against an underground nuclear weapons test that America was planning to conduct in an unstable island in Alaska. They set sail to the island Amchitka but were stopped by the US coast guards. Although it caused ripples, it did not result in any large-scale movement or protests by citizens. A legislation that Greenpeace could have used to stop America from carrying out those tests in Amchitka was not in place.



The United Nations stepped in. It organised the first world conference on environment—United Nations Conference on the Environment—in Stockholm in 1972. The creation of UNEP was the result of the Stockholm Declaration. This focused arm of the United Nations was able to gather leaders across the globe and commit them to finding solutions for the planet. There were thus mega conferences and smaller summits held globally to study and find solutions to the environmental problems. The issues these conferences brought to fore became the themes to celebrate the Earth Day. So in 1990 when Earth Day celebrations went global, slogans such as “think globally, act locally”, were coined. The theme for that year was pollution prevention.

It will not be an exaggeration to say that the mega conferences such as the Rio summit or Earth Summit, Earth Summit 2 and WSSD (World Summit on Sustainable

Development) were outcomes that were inspired by Earth Day. On the global front, it prompted Governments to act and overcome differences to find common acceptable solutions to the environment problems. Several important agreements were signed on Earth Day, such as the recent Paris Agreement of 2016—the legally binding international agreement on Climate change. This year United States administration has decided to convene the global summit on climate change on 22 April.

THEMES OF EARTH DAY

If conferences, summits, and declarations were the effect at a global scale Earth Day theme was the road map for actions at individual and community level. To act locally is as important as to act globally. Each year a different theme was chosen that highlighted the most immediate problem of the environment. In 2019 it was *Protect our species*; 2020 was about *Climate change*; 2021 highlighted *Restore our Earth*; and this year it is *Invest in our planet*. The themes brought about awareness at the community level, so that individual actions were not thwarted or negated.

Earth Day themes also inspired industries to go green. For example, the fashion industry accounts for around 8% of the total greenhouse gas emissions. Many of them have started to find ways and means to reduce the carbon footprint. Although they have a long way to go, there have been some baby steps taken. Individual and fashion industry support for small-scale weavers using handlooms for cloth production would be a step in this direction. The 2021 theme gave a platform for adopting emerging green technologies, encourage innovative thinking for finding solutions that can contribute to healing the world’s ecosystem.

This year’s theme therefore continues where the theme of 2021 ended. **Investing in our planet** requires restoration processes to be continued. Many of the life-forms with whom we share this planet are on the brink of extinction or are severely threatened. Habitat loss is a serious threat to many animals and plants. How do we highlight this on the Earth Day? What measures can we put in such that there are processes that we continue to be engaged with long after we have done with celebrating the Earth Day?

Earth Day is not to be seen as a day but as a sustained movement to highlight the processes that need to be brought about, the changes urgently needed in human beings, so that ‘Gaia-the Earth’ can breathe freely.

The following words of the Founder of Earth day sums it succinctly, what Earth day will ultimately signify for humanity and this Earth. -

“The ultimate test of (hu)man’s conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard”.

—Gaylord Nelson (1916-2005), founder of Earth Day

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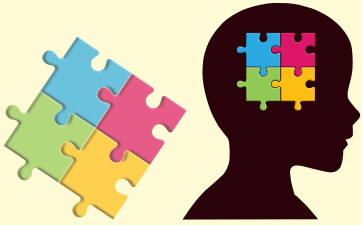


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AUTISM SPECTRUM DISORDER: A Neurodevelopment Disorder

Being told that your child has autism can be traumatizing and unbelievable for many parents and they might be stunned by such news. However, it is essential to understand that being autistic does not mean an individual has an illness or disease. It means his/her brain works in a

different way from other people. Till now there is no 'treatment' or 'cure' for Autism. Some people with autism need support to help them with certain things. The more we scientifically understand an autistic view of the world, the more we will be able to support them.

Autism Spectrum Disorder (ASD), commonly known as *autism*, is a neurodevelopment disorder caused by differences in the brain. It is characterized by difficulties with social communication and social interaction and restricted and repetitive patterns in behaviours, interests, and activities.



Does not make eye contact with others



Does not respond to their name being called out



Does not point their finger at what they want



Shows no interest in games their peers play



Rocks back and forth or makes other unusual gestures



Seems mesmerised by objects



Reacts disproportionately to changes in his/her daily routine



Falling behind their peers in speaking skills

The symptoms can be identified during early stages of development and affect daily functioning. The term 'spectrum' is used because everybody with autism is different—some autistic people need little or no support, others may need support from a parent or caregiver on a day-to-day basis.

Causes and Symptoms of Autism

The exact cause of ASD is unknown. It seems to be genetic, but parental age and prescription medications taken during pregnancy are also involved. Some children on the spectrum begin to show symptoms as young as a few months old, while others appear to have normal development milestones for the first few months or years of their lives before they start showing symptoms. However, up to half of the parents of children with ASD notice problems by the age of 12 months, and between 80 and 90 per cent notice problems by the age of two years. Children with ASD will have symptoms their entire lives, but they can improve as they get older. The autism spectrum disorder is extremely broad. Some people may have very noticeable issues, while others may not. Differences in social skills, communication, and behaviour when compared to those on the spectrum are the common thread.

Autism and social skills

A child with ASD finds it difficult to interact with others. Some of the most common symptoms are difficulties with social skills. They may desire close relationships but are unsure how to achieve them. If a child is on the autism spectrum, they may exhibit some social symptoms by their first birthday, such as not responding to their name; not being interested in playing, sharing, or talking with other people; preferring to be alone; avoiding or rejecting physical contact, including hugging; avoiding eye contact; not liking to be comforted while upset; and not understanding emotions—their own or others'.

How does autism affect communication?

Around 40% of children with autism

spectrum disorders do not speak at all, while between 25% and 30% have some language skills during childhood but lose them later. Some children with ASD do not begin to speak until later in life. Most have communication issues, such as delayed speech and language skills; a flat, robotic speaking voice or a singsong voice; echolalia (repeating the same phrase over and over), problems with pronouns (for example, saying 'you' instead of 'I'), not using or rarely using common gestures like pointing or waving and not responding to the gestures; inability to stay on a certain topic when talking or answering questions; inability to recognise sarcasm or joking; trouble expressing needs and emotions, and/or not getting signals from non-verbal communication, tone of voice and expressions.

Diagnosis

The earlier intervention for autism begins, the more likely it is to be effective. Signs and symptoms of ASD can be identified by early surveillance (collecting or gathering information) and screening (testing). Surveillance or developmental monitoring is an active on-going process of watching a child grow and encouraging conversations between parents and providers about a child's skills and abilities.

The diagnosis of ASD is based on diagnostic evaluations that often involve a team including a physician and a psychologist and may include other disciplines such as speech and language pathology or occupational therapy. The evaluation should consist of standardized observations of the individual, learning and cognitive abilities assessments, and interviews to gather information about behaviour across multiple settings and medical and developmental history.

Interventions

Several behavioural therapies for ASD have shown effectiveness in changing the cognitive level (e.g., IQ), specific skills (e.g., vocabulary, social skills, and joint attention), behavioural challenges, and mood. However, no data comparing various therapies

are available. Medications have been shown to reduce behavioural issues and improve mood. There is a lot of interest in finding treatments that change the core characteristics of ASD. The most well-established therapy incorporated applied behaviour analytic techniques, which have evolved to be more natural, developmental in sequence, and adaptable. Parent-mediated therapies, group models, and combined (medical and behavioural) therapeutic approaches have recently been developed and tested. Involving the family in interventions has consistently resulted in better outcomes.

Parents' responsibilities

Seeking professional advice: If parents notice that their child does not meet specific developmental milestones (or if they do but lose them later on), such as smiles by 6 months, imitates facial expressions or sounds by 9 months, coos or babbles by 12 months, gestures (points or waves) by 14 months, speaks with single words by 16 months and uses phrases of two words or more by 24 months and plays pretend or 'make-believe' by 18 months, they should seek professional advice immediately without ignoring or avoiding the issue, because early intervention is critical to autism therapy success.

Therapeutic approach: Parents should play a supportive and empowering role for their children. They should ensure that the approach is consistent at home and in therapy and focus on their child's progress rather than comparing them to other children.

Reinforcing positive behaviour: It is essential to consistently support (give positive praise or reward to) a child when they do something positive, rather than focusing on the negative behaviour. This must be done at home regularly by parents.

Society's responsibilities

Human beings are social creatures and people should extend compassion, help, and love for all. This should have been the classical case, but the real world is far different from what we talk in theory. Human society throws out or shuns



people with unexplained or complicated medical conditions. The degree to which a person is being shunned by his/her immediate society depends on the composition and character of the society. People often ignore a person because they cannot relate to their condition due to ignorance, illiteracy, orthodox attitude, generalization or classification, the prevalence of myths, etc.

We, as a society, should work towards the prevention and early detection of autism. Some steps like providing free education, employment, and unemployment allowance to people with autism are often thought of. We should also ensure whether aids and appliances are made available to people with autism. Social security, like financial assistance to non-government organizations to rehabilitate persons with autism, should also be provided.

Autism is not common, what is more common is not talking about it. We should appreciate parents who have understood that it is not abnormal, but “special”. Autism comes with specializations, skills, talents and, growth of high level of IQ in an individual. An autistic



SCHEMES FOR PERSONS WITH DISABILITIES

1. <http://socialjustice.nic.in/schemespro3.php>
2. <http://innovationclustersarchive.nic.in/content/page/awareness-generation-and-publicity.php>
3. <http://innovationclustersarchive.nic.in/content/page/ddrs.php>
4. <http://innovationclustersarchive.nic.in/content/page/rajiv-gandhi-national-fellowship-for-students-with-disabilities.php>
5. <http://innovationclustersarchive.nic.in/content/page/scheme-of-financial-assistance-for-skill-training-of-pwds.php>
6. <http://innovationclustersarchive.nic.in/content/page/incentive-scheme1.php>
7. <http://innovationclustersarchive.nic.in/content/page/assistance-to-disabled-persons-for-purchase.php>

SCHOLARSHIP SCHEMES FOR THE PERSONS WITH DISABILITIES:

1. <http://innovationclustersarchive.nic.in/content/page/rgnf-for-students-with-disabilities.php>
2. <http://innovationclustersarchive.nic.in/content/page/nos--for-students-with-disabilities.php>
3. <http://innovationclustersarchive.nic.in/content/page/pre-matric-and-post-matricsscholarship-for-students-with-disabilities.php>
4. <http://innovationclustersarchive.nic.in/content/page/scholarship-scheme-from-trust-fund.php>
5. <http://innovationclustersarchive.nic.in/content/page/scholarship-scheme-from-national-fund.php>
6. <http://innovationclustersarchive.nic.in/content/page/proposed-scholarship-schemes.php>
7. <http://innovationclustersarchive.nic.in/content/page/scholarship-of-top-class-education.php>



FACTS

- ✚ As per WHO, about one in 160 children has an ASD.
- ✚ ASD occurs in all racial and ethnic groups and across every socioeconomic status level.
- ✚ Boys are about four times more likely to have ASD than girls.
- ✚ A child is more likely to be on the spectrum if his/her immediate family member (brother, sister, or parent) is autistic. But it doesn't always run in families.
- ✚ About 10% of children with ASD have a form of a genetic disorder such as Down syndrome and Fragile X syndrome.
- ✚ A Danish study found a link between ASD and the advanced parental age of either parent.
- ✚ Women prescribed opioids before pregnancy are likelier to have a child with ASD.

Source: <https://www.swavlambancard.gov.in/cms/schemes-for-persons-with-disabilities>

person puts his/her heart and soul into understanding the various phenomenon and excel in the field which they like the most, and quite often come up with awestruck ideas, ways, and methods of doing things. Autism needs early intervention and better understanding so that it could help them function more independently and live a fulfilling life.

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(Source: www.jwst.nasa.gov)

The James Webb Space Telescope (JWST) is an infrared space observatory, which has been developed with contributions from the European Space Agency (ESA) and the Canadian Space Agency (CSA). It is NASA's largest and most powerful space science telescope and is a successor of the Hubble Space Telescope. The JWST was launched on 25 December 2021 from ESA's launch site at Kourou in French Guiana, on board an Arianespace Ariane 5 rocket. It is designed to provide improved infrared resolution and sensitivity over Hubble, viewing objects up to 100 times fainter. After travelling to 1.5 million kilometres from the Earth, it arrived on 24 January 2022 at its cosmic parking spot, the second Lagrange point (L2), which is a gravitationally stable location in space near Earth that lies opposite from the Sun. This orbit will allow the telescope to stay in line with the Earth as it orbits the Sun. JWST will detect primarily the infrared light outside the visible range to show the hidden regions of the space and probe the cosmos to uncover the history of the universe from the Big Bang. It will focus on four main areas, namely, the first light in the universe, assembly of galaxies in the early universe, birth of stars and protoplanetary systems, and planets, including the origins of life.

The Webb has over 1200 skilled

Dr Hashima Hasan: A Scientist's Journey from AMU to NASA

scientists, engineers, and technicians from 14 countries (and more than 27 US states) that participated in its building. Assembly and testing of the mirror and instruments occurred at NASA Goddard. The JWST Team at Goddard Space Flight Center comprises 43 scientists and engineers, led by Prof. John Mather, Astrophysicist and Nobel Laureate. Dr Hashima Hasan is a distinguished member of this team and holds the position of JWST Deputy Program Scientist and the Education and Public Outreach Lead for Astrophysics. Dr Hasan works on monitoring and managing the science program for the Webb Telescope. She makes sure that its mission remains possible and true to NASA's strategic objectives. She has been honoured with prestigious awards and fellowships throughout her outstanding career, such as the NASA HQ Exceptional Performance Award in 2008; National Research Council Resident Research Associate from 1981-1983; and Commonwealth Fellowship from 1973-1976.

Dr Hashima Hasan demonstrates how women can show their excellence in science and turn adversity into victory. She is a great motivation for women and girls, especially those who want to pursue science and contribute to the development of the society.

Hashima was born in Lucknow—a city of monuments and heritage buildings. She hails from a highly educated family that believed in education and equality of women. Her mother, being a college graduate herself, encouraged her interest in science and mathematics, which was rather uncommon in those times. It was October 1957 when the night sky was full of stars; her grandmother assembled the entire household at the backyard at dawn to watch the Sputnik, launched by

Russia, passing by the clear sky. This left an everlasting impression on the mind of the little girl Hashima and she dreamed to become a space scientist some day.

After her schooling, Hashima joined the Lucknow University to study science and mathematics in the undergraduate programme. She was awarded gold medal by the university. Next, she joined Aligarh Muslim University (AMU) in 1968 to pursue the Master's programme in Physics and won the gold medal. According to her, it was the student life at AMU from 1968 to 1973 and the academic credentials gained at the university that helped her to get selected for several prestigious scholarships after her post-graduation. She, however, opted for the prestigious Commonwealth Fellowship from 1973-1976 for further pursuing higher studies in Nuclear Science at the University of Oxford, UK, where she earned a doctorate in 1976. On returning back to India, she joined the Tata Institute for Fundamental Research as a research scientist and also worked at the Bhabha Atomic Research Centre in Mumbai. Later, she was selected as a faculty of Poona University. During this period her career oscillated between Theoretical Nuclear Physics and Environmental Science.

In 1985 she entered an entire new field of Space Science, when she was offered a research position of Optical Telescope Assembly (OTA) Scientist at the Space Telescope Science Institute (STScI) in Baltimore, Maryland, USA to write a software to simulate the optics of NASA's Hubble Telescope and its instruments. She wrote the Telescope Image Modelling (TIM) software to analyse the optical error of Hubble after launch and keeping it in the best focus until a fix could be installed. She also did a final analysis to focus the telescope before the corrective

optics could be deployed during the first Hubble Servicing Mission. She regularly monitored the images to learn about the health of the telescope optics, degradation of filters in the Faint Object Camera, and image characteristics. It was found that the graphite epoxy truss that supported the primary and secondary mirrors, desorbed water faster and longer than calculations had predicted, causing minute shrinkage in the truss. This meant that approximately every three months the mirror had to be moved to bring it back to the “best focus” established by the science community. She also participated in the design and optical testing phase of the Corrective Optics Space Telescope Axial Replacement (COSTAR). During the first servicing mission, she did a final image analysis and focusing of the telescope before COSTAR was deployed. She had been allowed three attempts to focus the telescope, but she achieved it just in a single attempt and COSTAR was deployed ahead of the schedule. In the following two years, she continued to work on the Hubble optics, a concept for an Advanced Camera for the Hubble, and astronomical research on barred galaxies.



Dr. Hasan in front of Webb Mirror at Goddard Space Flight Center, Maryland. Source: twitter.com/nasawebb

manage flight missions and research programs, grants management, budgets, lead community working groups, strategic planning, international negotiations, and about the working of the Federal Government. Although it was a two-year job, she found the working at the NASA Headquarters so thrilling and rewarding that she stayed on. When she saw her first Shuttle launch in 1995, it gave her great excitement. Her second Shuttle launch was in 1996 when she was the Program Scientist. By 1999, she had achieved sufficient skills and experience and was appointed as the Program Scientist for the Hubble, a position that she held till 2004. She provided scientific oversight to the instruments, Wide Field Camera 3, and the Space Telescope Imaging Spectrograph (STIS), taking strategic decisions to enable development within cost and schedule. She participated in two servicing missions, SM3A and SM3B. Dr. Hasan had been the Program Scientist for several Astrophysics missions, including the Hubble Space Telescope. She qualified for the NASA Senior Executive Service (SES) in 2003, after training in the SES Candidate Development Program (SESCDP).

Her involvement with the JWST started in 1995, when it was a mere concept referred to as the Next Generation Space Telescope (NGST). She was appointed as NGST Program Scientist from 1999-2001 and JWST Program Scientist from

2011-2015. She led the solicitation and selection of early technology development. She led the appointment of an Interim Science Working Group to develop the requirement for NGST science instruments. Her team at NASA had a contentious negotiation with the partners, the European Space Agency (ESA) and the Canadian Space Agency (CSA), on the Mid-Infrared Instrument (MIRI), which was amicably resolved.

Dr. Hasan developed a strategy for selecting a NASA Center for Management of the MIRI. They were conducting a review of proposals for MIRI management on the fateful day, 11 September 2001. However, they did not let adversity stop them and now MIRI and all the other science instruments are installed on JWST. Lessons learned from Hubble development have been applied to JWST development, including complete optical testing in a specially modified chamber at Johnson Space Center (JSC). The building of JWST is another example of “Explore as One,” where scientists, engineers, private industry, and non-US space agencies came together with the ambitious goal of learning how the first stars and galaxies were born.

Apart from research, Dr. Hasan, in the capacity of the NASA Education and Communication Lead for Astrophysics, has delivered numerous talks for school, college, and university students. She also delivered an interesting talk at the FTK Centre for Information Technology, Jamia Millia Islamia, New Delhi on 31 January 2013 on the topic, “NASA Flight Mission: JWST”.

She presented an overview of the

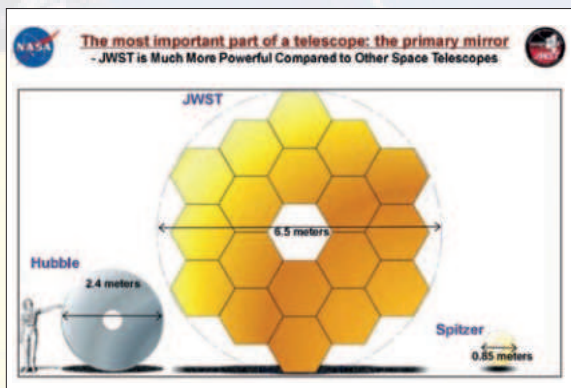


Dr. Hasan, delivering a talk on “NASA Flight Mission: JWST” at FTK Centre for Information Technology on 31 January 2013

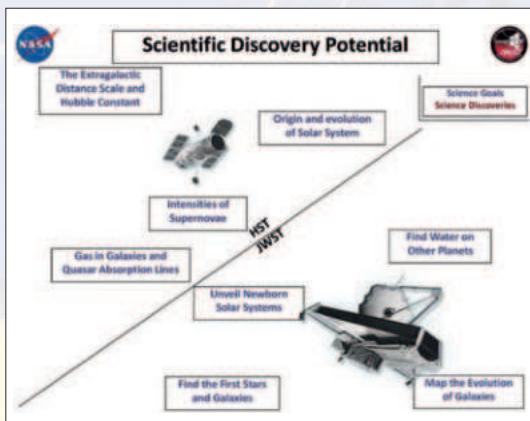
“I am proud to be a part of the NASA team that turned adversity to victory. The story of Hubble is a tribute to NASA’s ‘can do’ attitude. The entire scientific, technology and human space flight community rallied around Hubble in the true ‘Explore as One’ spirit to fix Hubble. The brave astronauts, who undertook the life-threatening job of servicing Hubble five times, helped make the observatory what it is today.”

Dr Hashima Hasan

In 1994 Dr. Hasan joined the NASA Headquarters as a Visiting Senior Scientist to manage the Ultraviolet, Visible, and Gravitational Astrophysics program. There she learned how to



(Source: Dr Hashima Hasan, JWST Mission, NASA; 31.1.2013)



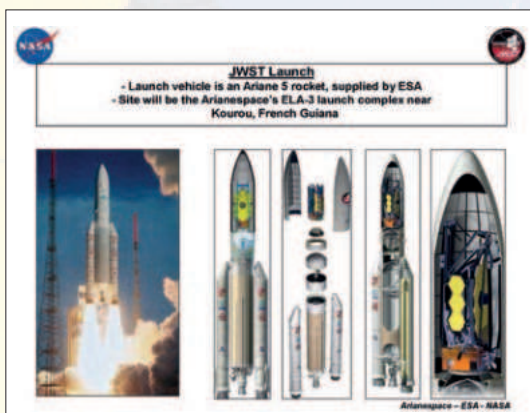
(Source: Dr Hashima Hasan, JWST Mission, NASA; 31.1.2013)

The James Webb Space Telescope

The Next Big Telescope After Hubble: JWST

HST - size of a school bus - distance = 350 miles - Orbital time (earth) = 97 minutes - weight = 24,500 lbs - length = 43.5 feet	
JWST - size of a tennis court - distance = 930,000 miles - Orbital time (Sun) = 1 year - weight = 14,000 lbs - length = 72 feet - operating temperature = 40 K	

A comparison of the Hubble Space Telescope (HST) with James Webb Space Telescope (JWST)



(Source: Dr Hashima Hasan, JWST Mission, NASA; 31.1.2013)



(Source: Dr Hashima Hasan, JWST Mission, NASA; 31.1.2013)



Dr Hasan with her colleagues at NASA Observatory (2021)

Astrophysics missions undertaken by NASA since 1995 (Hubble space Telescope). She explained that the JWST mission is an orbiting infrared observatory that will complement and extend the discoveries of the Hubble Space Telescope, with longer wavelength coverage and greatly improved sensitivity. The longer wavelengths enable the Webb telescope to look much

closer to the beginning of time and hunt for the unobserved formation of the first galaxies, as well as to look inside dust clouds where stars and planetary systems are forming today. Explaining the evolution in telescopes through years, she described the need for such a large mirror telescope. Giving details of various science payloads on JWST, she related the various mission goals with

the powerful Near Infrared Camera (NIRCam), Near Infrared Spectrograph (NIRSpec), and MIRI. Taking the audience on a mesmerizing journey in the cosmological history, Dr Hasan explained how JWST mission can change the way we look at the universe. The power of infrared vision, which allows the JWST to see through dust clouds, could bring us face to face with the birth of stars and proto-planetary systems. It can greatly improve our understanding of the formation of our own solar system. So far the farthest we have seen in our universe is through the Hubble Deep Field Infra-red camera (~480 million years since Big-Bang). In comparison, the JWST would allow us to see much deeper in space (~200 million years since Big Bang). This means we

can see the first light from the earliest galaxies. She also gave an overview of the scientific discovery potential of the mission, namely, finding water on other planets, unveil new born solar systems, mapping evolution of galaxies, finding first Stars and galaxies, etc. Through her talk, Dr Hasan ended the one-hour journey in deep space with a beautiful animation of JWST spacecraft deployment, showing some of the major innovations of this mission, like the Foldable Mirror and a deployable Sunshield. From the year of launch, the JWST mission duration would be 5-15 years. A few slides of her presentation on James Webb Space Telescope Mission are shown here.

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Genius and eccentricity often go hand in hand. Their behaviour is quirky, whacky, or eccentric. Eccentricity is often associated with intellectual giftedness. One may perceive such odd behaviour as expression of creative impulse. John Stuart Mill, English thinker wrote, “the amount of eccentricity in a society has generally been proportional to the amount of genius, mental vigour and moral courage which it contained”. Genius shows eccentric behaviour because they are not afraid of people’s opinion. It may stem from certain mental disorders such as obsessive compulsion disorder, autistic spectrum disorder, or even may be a deliberate attempt to differentiate themselves from societal norms. However, Scottish psychologist David Weeks differentiated mental illness from eccentricity as eccentrics are happy and are less prone to mental illness. On the other hand, people with very high IQ scores (140 or so) were studied over a long period of time and



Bizarre Habits of Geniuses

(held more than 300 patents), rested two hours a day (power nap?). He had a strange habit of curling his foot toes 100 times every evening before going to bed. He thought this action boosted his brain cells! He was also so obsessed with number 3 that he would walk around a building 3 times before entering it! At each meal, he would use exactly 18 napkins to polish the utensils until they sparkled!

(vi) **Dr Yoshiro Nakamasu**, the scientist, patented floppy disc in 1952 and had over 3,300 inventions to his credit. He would stay under water without oxygen to visualise an invention! He used to jot down an idea on an underwater pad and swim back to surface. He used to say “to starve the brain of oxygen, you must dive deep and allow the water pressure to deprive the brain of blood. Zero-point-five seconds before death, I visualized an invention”. In order to prevent interference of radio and TV waves to his creative ideas, he would stay



Charles Dickens (Source: listverse.com)



Dr Yoshiro Nakamasu (Source: Pyramid Beach)

it was found that they did not achieve anything spectacular in life.

Here are glimpses of strange habits of some of the most respected inventors, music composers, writers, surgeons, artists, and scientists which may amaze you.

(i) **Ludwig Van Beethoven**, the great composer, kept a tub of water handy to pour water all over himself while writing compositions! He wrote Symphony No 9 while being already deaf! He also had a nasty temper that alienated his household staff from him.

(ii) **Honore de Balzac**, the famous

French novelist, owed his productivity to 50 cups of coffee a day! This habit came with a price—stomach cramps, headache, and high blood pressure!

(iii) **Igor Stravinsky**, the Russian-American composer, stood on his head for 15 minutes each morning to clear his brain! Deleting trash to bin?

(iv) **Edgar Allan Poe**, the great detective story writer, wrote novels on thin strips of paper glued together and rolled into scrolls for easy storage. So, instead of sheets of papers, he used to deliver scrolls to publishers!

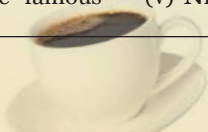
(v) **Nikola Tesla**, the famous inventor

in a bathroom tiled with 24 karat gold! He thought that gold reflected radio and TV waves and provided an interference-free space.

(vii) **Richard Buckminster Fuller**, scientist and architect, documented his life every 15 minutes, from 1920 until 1983.

(viii) **Sigmund Freud**, a pioneer psychologist, was addicted to smoking cigars all day so much so that it took 33 surgeries on his mouth and jaw to remove the cancer it caused! Despite this, he continued smoking cigars.

(ix) **Vladimir Demikov**, a Soviet



surgeon, created a two-headed dog by grafting head and forelimbs of a smaller dog onto the neck of a larger dog in 1954. He succeeded in connecting two heads so well that both were able to hear, smell and see! You say pervert? But this paved the way for organ transplant in human bodies!

(x) **Henry Cavendish**, English chemist and physicist, was terrified of woman. He warned his housemaids to keep out of his sight and communicated with them through notes left on kitchen table. Those who protested lost job.

(xi) **Charles Dickens**, celebrated novelist, would write novels facing north! He also used to hangout at morgue where he watched people to work on incoming bodies! Grotesque? But he used this repulsive attraction to write better crime stories.

(xii) **Benjamin Franklin** took daily swims in London's chilly river Thames!

(xiii) **Pythagoras**, the Greek philosopher and mathematician, would starve himself

days. He avoided taking bath and even considered it a health hazard!

(xvii) **Friedrich Nietzsche**, the German philosopher, wrote while standing up, considering it to be the only proper way to achieve something!

(xviii) **Franz Schubert**, the famous composer, had very poor eyesight which required him to wear glasses all the time. He even slept with glasses on!

(xix) **Andy Warhol**, the pop artist, used to wear a wig. He had an unusual habit of collecting wigs (had collection of 40 wigs!).

(xx) **Glenn Gould**, the Canadian pianist, was afraid of catching germs and falling sick. He always wore overcoat and gloves in all temperatures!

(xxi) **Pablo Picasso** (full name: Pablo Diego Jose Francisco de Paula Juan Nepomuceno Maria de los Remedios Cipriano de la Santisima Trinidad Ruiz y Picasso), always carried a revolver to wherever he went!

(xxii) **Jane Austen**, the celebrated

notes suggesting they were "mouldy"!

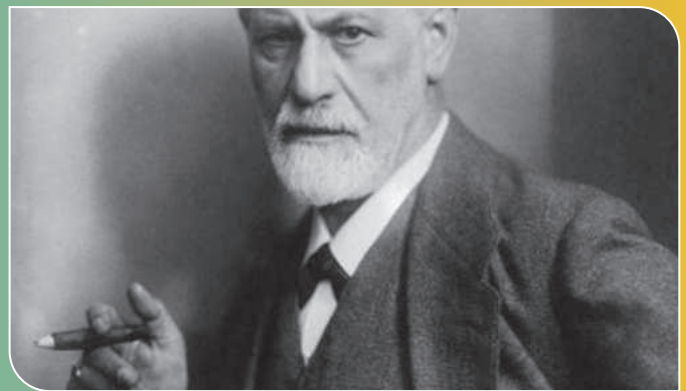
(xxiv) **Dan Brown**, the renowned bestselling author (Da Vinci Code fame), believed hanging upside down relaxes him and allows better concentration on his job!

(xxv) **Victor Hugo**, famous novelist (Hunchback of Notre Dame fame), used to instruct his valet to confiscate all his clothes so that he could not go out to finish writing before deadline. Even during coldest days, he wrapped himself in a blanket to write his story!

What is the moral of the story? You need to be quirky in order to be a genius? Wrong! You can be a genius with normal behaviour and this is more acceptable to society. A truly learned person is always humble and down-to-earth, devoid of any intellectual arrogance. This is illustrated by Albert Einstein, who was once invited by the Queen of Belgium. He got down at the station and reached destination unmindful of the gathering at the station to receive him! When Marie



Nikola Tesla (Source: listverse.com)



Sigmund Freud (Source: listverse.com)

for 40-day periods with strict water-only diet in the belief that it boosted mental perception and creativity!

(xiv) **Steve Jobs** of Apple fame cried incessantly when he was frustrated and did not get his way!

(xv) **Erik Sati**, the prominent French composer, had weird eating habits. He ate only white foods (e.g., eggs, sugar, salt, coconuts, rice, etc.). Every day he rose at 7.18 am and had lunch at 12.11 pm, dinner at 7.16 pm and retired to bed at 10.37 pm without fail!

(xvi) **Michelangelo**, the celebrated artist, slept with clothes and boots on for

novelist, preferred to work alone and did not like to share her work with anyone before it was finished. To stop intrusion, she ensured that the hinges on the door creaked thereby alerting her!

(xxiii) **Maya Angelou**, the renowned American author, never worked at home; instead she rented a hotel room in every town she ever lived in just to use it for writing. She wrote while lying on bed and asked hotel staff to remove everything from the walls of room to avoid distraction. She never allowed the room to be cleaned or sheets to be changed even when the hotel staff left

Curie got Nobel prize for the first time (she received two Nobel prizes in physics and chemistry and her family has a record of four Nobel prizes), reporters reached her home for interview and found one peasant-looking woman sitting at the door step. When enquired, she replied nonchalantly "Madam Curie is not at home". This peasant-looking woman was Madam Curie!

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Vigyan Sarvatra Puujate

Vigyan Sarvatra Puujate (VSP), a glorious week-long science festival, was celebrated during 22-28 February 2022. It was a pan-India programme with events organised across 75 locations throughout the country. *Vigyan Sarvatra Puujate* is a Sanskrit phrase which means Science and Technology is revered all over.

The VSP festival was one of a kind, as nothing of this extent has ever taken place in the recent past on such a grand scale. The festival covered the country across the length and breadth from north to south-Leh and Srinagar to Port Blair and Kavaratti Islands in Lakshadweep and from west to east-Ahmedabad and Daman to Itanagar, Kohima, and Aizawl, apart from the national capital of India, New Delhi. A mega science expo and a science book fair was also organised at the Jawaharlal Nehru Stadium, New Delhi during the week.

The aim of the Festival was to showcase Science, Technology, and Innovation (STI) from every part of the country in all Indian languages for orienting people towards STI, making them understand and witness the incredible journey of Indian STI and also pay homage to India's scientific achievements in 75 years of independence.

VSP is part of the initiative 'Azadi Ka Amrit Mahotsav', which is a year-long initiative of the Government of India to the 75th anniversary of independence that will end on 15th August 2023. VSP is linked a lot around the figure 75: 75 locations, 75 films, 75 posters, 75 books



Exhibition at Kohima, Nagaland



Four books released during the National Science Day Function on 28 February



Recipients of the awards with the dignitaries at the National Science Day Function

& book fairs, and a lot more. There were 75 lectures by eminent experts from every S&T-related Ministry, 7-day long expositions at 75 locations, 75 lectures by eminent experts from the Indian diaspora, 6 national competitions for school and college students, 75 curtain-raiser programmes at 75 locations, and much more.

The programme, planned under the aegis of the office of the Principal



ISRO National Remote Sensing Centre (NRSC) in Hyderabad

Scientific Adviser (PSA) and Ministry of Culture, Government of India, was implemented by Vigyan Prasar. It was supported by Department of Science & Technology (DST), Department of Biotechnology (DBT), Council of Scientific and Industrial Research (CSIR), Ministry of Earth Sciences, Department of Atomic Energy, Department of Space, Indian Council of Medical Research (ICMR), All India Council for Technical Education (AICTE), Defense Research Development Organisation (DRDO), and, University Grants Commission (UGC).

VSP was inaugurated at Vigyan Bhavan, New Delhi on 22 February and was broadcast live at all the 75 locations across the country, where the festival was to be organised. Union Minister of State (Independent Charge) Science & Technology; Minister of State (Independent Charge) Earth Sciences;



Hands-on activities for school students at Ahmedabad

PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space Dr Jitendra Singh and Union Minister for Culture, Tourism and Development of North Eastern Region of India Shri G. Kishan Reddy, in the presence of other dignitaries, inaugurated the programme.

Prof. K VijayRaghavan, Principal Scientific Adviser (PSA), Government of India; Dr S. Chandrasekhar, Secretary, DST; Dr Parvinder Maini, Scientific Secretary, Office of PSA; Dr Nakul Parashar, Director, Vigyan Prasar and other senior officials were also present for the event.

The Festival was organised on four themes:

1. 'From the Annals of the History of S&T', which traced the contributions of founders of modern science and institutions of national importance to nation-building. It was done by screening of 75 films on 75 scientists and 75 lectures by eminent scientists and technocrats across the 75 locations.
2. 'Milestones of Modern S&T' highlighted critical discoveries, innovations, and inventions that made a mark in the global science or India's development story.
3. 'Swadeshi Paramparik Inventions and Innovations' showcased 75 inventions or technologies that made India self-standing and helped in achieving the goal of self-reliance by drawing upon the reservoir of traditional knowledge systems, such as drugs from herbs.
4. 'Transforming India' looked at the road ahead for the next 25 years of Indian S&T. It included talks by 75 eminent scientists & technocrats from India and the diaspora on their ideas for Indian S&T as it marches towards the centenary year of India's independence.

The programme was held in various Indian languages, such as Kashmiri, Dogri, Punjabi, Gujarati, Marathi, Kannada, Malayalam, Tamil, Telugu, Odia, Bangla, Assamese, Maithili, Nepali, Urdu, and English.

In addition to this, a standalone portal <https://vigyanpujyate.in/> was developed to list all the project details of Vigyan Sarvatra Pujyate at one place. The website is the repository of all key



Science fair at the Kozhikode centre

information regarding the project.

Several events were organized in 75 cities to showcase India's achievements in science and technology, and the cities were chosen based on their prior experience of working and their network. All states and union territories were taken into consideration and an analysis was done to evaluate government bodies, universities, schools, local organisations and ministries. State councils, science organization, NCSM etc. that work on popularising S&T at the grass-root level were roped in.



Highlights of the Key Activities

In all the 75 cities, numerous activities were organised over a wide spectrum, including lectures, science exhibitions, competitions, book fairs, skits, theatres, film screening, science literature activities, and much more. The response of the students from all these places was overwhelming; the attendance proved that students indeed take interest in practical science.

Lectures by eminent scientists were delivered in hybrid mode in various Indian languages. Academics and researchers from Indian diaspora were also invited to share their knowledge and experience with the students.

In New Delhi, at Jawaharlal



Lecture at Thiruvananthapuram

Nehru Stadium, prominent speakers who interacted with audience were: Dr Debojyoti Chakraborty, Senior Scientist from Institute of Genomics and Integrative Biology (IGIB-CSIR); Dr Tessy Thomas, DRDO, popularly known as the Missile Woman of India; Prof. Deepak Kumar, retired professor of History of Science and Education at the Jawaharlal Nehru University, New Delhi; Padma Shri Vaidya Rajesh Kotecha, Secretary, Ministry of AYUSH; Dr Indumathi D, an Indian particle physicist and a professor at The Institute of Mathematical Sciences, Chennai; and Dr Tanu Jindal, Director, Amity Institute for Environmental Toxicology, Safety and Management.

The content of 75 books, 75 radio programmes, 75 films, and 75 posters was developed and designed by Vigyan Prasar. The 75 science films, which were produced by Vigyan Prasar, were screened at 75 locations. The screened films were based on subjects such as, Indian scientists and their contribution, Self-reliant India, Fight against COVID-19 etc. Through these films the achievements of Indian science and technology were depicted.

Exhibitions were held at 75 locations where posters conceptualised by Vigyan Prasar were shown. These posters were on eminent Indian scientists, milestones of India's science and technology, India's scientific heritage, agriculture, irrigation, heavy industry, chemical industry, and so on.

To engage maximum number of participants, online competitions in collaboration with mygov.in platform were conducted at the national level which were open for everyone. The competition included essay writing, poster making, slogan and poetry writing, video making, and quiz. The

competitions didn't have any entry fees. From every corner of the country, large number of participants took part in them. Everybody participant would receive a certificate.

At all the 75 locations, several competitions were held on the themes of the Festival, which included quiz programmes, essay, poster, and poetry contests.

Live session from Bharati Station, Antarctica

Antarctica is an important part of our climate system and it is greatly sensitive to climate changes. An Indian research base 'Bharati', located about 3000 km east of Maitri, was commissioned on 18 March 2012 to facilitate year-round scientific research activity by the Indian Antarctic program.

Vigyan Prasar hosted live sessions with Bharati Station for 5 days during 23-27 February, as part of the VSP celebration. These were held each day for an hour during 4-5 pm (IST) through video call and were also live streamed. Apart from the spectators at the Jawaharlal Nehru Stadium, New Delhi, school students and teachers and common people joined in from all over India to interact with the scientists present at Bharati. The brand ambassador of Engage with Science Sharman Joshi also interacted with the Team at Bharati on the final day of the event. Students from all parts of the country were very inquisitive and asked several questions related to the functioning and activities of the Station, its importance for India and the global community, selection process for the core team, its training, health and fitness, how they manage the waste generated, managing psychological issues, etc.

Space on Wheels by Indian Space and Research Organisation (ISRO)

Space on Wheels is an innovative concept and specially designed mobile exhibition/buses that were organised by CBPO, ISRO HQ and deployed at ISRO centres in six states. These mobile exhibitions covered 17 cities of India and focused on providing insight on ISRO's expertise in deploying rockets, satellites,



Activities in Port Blair



School students at Amritsar

and key achievements in the last 75 years. They covered Bengaluru, Mangalore, Mysore, Trivandrum, Ernakulum, Calicut, Vijayawada, Vishakhapatnam, Bhubaneshwar, Shillong, Guwahati, Ahmedabad, Udaipur, Jodhpur, Hyderabad, Warangal, and Nagpur. Thousands of local students from the local schools and colleges visited the exhibition.

Mega Expo and Science Book Fair

A mega expo and a national science and technology book fair were organized at the Jawaharlal Nehru Stadium, New Delhi in which various ministries and publishing houses participated. The participating ministries showcased their various milestones and achievements in the mega expo. DST and its autonomous institutes; DBT and its autonomous research institutes; CSIR; ICMR; ICAR; National Council of Science Museums (NCSM); Ministry of Ayush; DRDO; AICTE; Indian Council of Forestry; Ministry of Environment, Forest and Climate Change, and its research institutes; Department of Atomic Energy (DAE); ISRO; National Institute of Hydrology (NIH), Roorkee; Indian Institute of Technology (IIT), Bhilai; Amity University; SCI COMM, etc. participated in the Mega Exhibition.

In the National Science Book Fair 76 reputed publishers representing various

government and non-government organisations participated. National Book Trust, Publications Division, and Federation of Indian Publishers were the partners of Vigyan Prasar in organising the book fair. Schools and college students, book lovers and science enthusiasts visited the fair in great numbers. It was also a platform to bring together science writers, communicators, artists, poets, dramatists, street play artists, hands-on science demonstrators, journalists, students, and teachers. The Science Lit Festival aimed in communicating science through theatre, poems, various folk forms including puppet show, shadow play etc. was a huge success as well.

The Festival ended with a grand valedictory function on the National Science Day, 28 February, at Vigyan Bhavan, New Delhi. Hon'ble Minister Dr Jitendra Singh presented the National S&T Communication and the AWSAR (Augmenting Writing Skills for Articulating Research) awards to the recipients at the function. He also released three coffee-table books published by Vigyan Prasar, named as 'Department of Science & Technology: Past-Present-Future', '75 under 50: Scientists Shaping Today's India', and '75 Founders of Modern Science in India' and a Science cartoon book, titled 'Meet, Greet & Tweet with Plasma Toons', written by Dr B. S. Munjal and Dr Suryakant Gupta of Institute for Plasma Research.

To sum up, over two million spectators and participants in addition to virtual participants from different parts of the country including students, parents, scientists, artists, journalists, science communicators and general public from urban and rural areas enjoyed the events held during the Nation Science Week. As said by our hon'ble Prime Minister Shri Narendra Modi, 'Jan Bhagidari' (people's participation) and 'Jan Chetna' (people's awareness) would enhance India's position at the world stage. The Festival was a major step towards the realisation of this vision.