

July 2026

Young Scientist India

A Science & Innovation Magazine for Curious Teachers

Scamper

Idea Evaluation Matrix

Reusable Launch Vehicle – RLV LEX

AI-Powered Crop Disease Detectors

K Kasturirangan

C N R Rao

A S Kiran Kumar

R Chidambaram

SMART VILLAGES

Young Scientist India

Table of Contents

COVER STORY

- 08 Innovations for Smart Villages

INNOVATION TRAINING MODULES

- 18 SCAMPER
30 Idea Evaluation Matrix

ARTICLES

- 04 The World is a Prototype
24 The Science of Scents
36 Innovations for Clean Air

INDIAN INVENTIONS & INNOVATIONS

- 16 AI-Powered Crop Disease Detectors
26 Indigenous Aircraft Carrier Weapons Systems
42 Reusable Launch Vehicle RLV LEX

INDIAN SCIENTISTS

- 14 K. Kasturirangan
22 C. N. R. Rao
34 A. S. Kiran Kumar
40 R. Chidambaram

S&I LABS & ORGANIZATIONS

- 15 SERC - Structural Engineering Research Centre
23 IIA- Indian Institute of Astrophysics, Bengaluru
35 IIG- Indian Institute of Geomagnetism, Navi Mumbai
45 IIIM, Jammu - Indian Institute of Integrative Medicine

INNOVATIONS FOR INSPIRATION

- 07 Life-saving slippers from Snake Bites
Innovative Disinfecting Straw
29 Agro Electric Nexus. Sub Topic :- Agriculture
Cellovera
41 Pen Holding Tool for Handless Person
G Bags for Smart Preservation
46 Easy Waste Separating Chopping Board
Integrated Pothole Sealer

Editorial

Publisher

Murali Valiveti

Editor

Vennela Valiveti

Content Director

Krupa Kiran Nandamudi

Contributors

Bharath Valiveti
Rishita Raj Sirivolu
Padma Priya Sikhakollu
Naveena Savanam
Ramya Sri Vutukuri

From the Editor's Desk

Welcome, Future Innovators & Mentors!

A warm hello to our enthusiastic students and dedicated teachers! I am thrilled to present the July 2026 issue of *Young Scientist India*, packed with fresh ideas, groundbreaking science, and endless inspiration designed to spark your imagination.

Our Cover Story, **Innovations for Smart Villages**, shows how creative problem-solving can transform rural communities and build a brighter, more sustainable future. Great inventions are not limited to high-tech labs; they can blossom right in our local spaces!

Ready to sharpen your problem-solving skills? Dive into our Innovation Training Modules featuring **SCAMPER** and the **Idea Evaluation Matrix**. These hands-on methods will guide you in taking raw ideas, testing their potential, and refining them into game-changing inventions.

In our article section, **The World is a Prototype** invites you to treat everyday life as a canvas for endless improvement, while **The Science of Scents** and **Innovations for Clean Air** uncover the captivating chemistry of our daily environments.

We also celebrate homegrown brilliance! Discover remarkable Indian advancements like **AI-Powered Crop Disease Detectors**, **Indigenous Aircraft Carrier Weapons Systems**, and the **Reusable Launch Vehicle RLV LEX**. Be sure to explore the legendary journeys of pioneering visionaries like **K. Kasturirangan**, **C. N. R. Rao**, **A. S. Kiran Kumar**, and **R. Chidambaram**.

Plus, get energized by brilliant student creations in *Innovations for Inspiration*, featuring life-saving snake-bite slippers and clever waste-sorting tools, alongside guided introductions to world-class Indian research hubs like **SERC** and **IIA Bengaluru**!

Let this edition ignite your passion to question, dream big, and transform your vision into reality!

Stay curious.

Keep innovating.

The future belongs to you!



Vennela Valiveti, B. Des.
YSI Magazine Editor
Interior Designer
Ph. 9030600470



S&I Article

The World is a Prototype

The Future is a Prototype - Design It!

Look around you right now. Your smartphone, your school bag, your water bottle, even the desk you are sitting at - they all seem finished, complete, and permanent.

But what if you looked at them through a completely different lens?

What if everything around you is actually a **prototype**, a temporary version waiting for someone like you to invent its upgrade?

Welcome to one of the most exciting mindsets in science and innovation: the world is an unfinished draft.

What Does "The World is a Prototype" Really Mean?

When we think of a prototype, we usually picture a rough model in a high – tech lab. But the concept goes far beyond engineering workshops – it is a way of seeing the entire world around us.

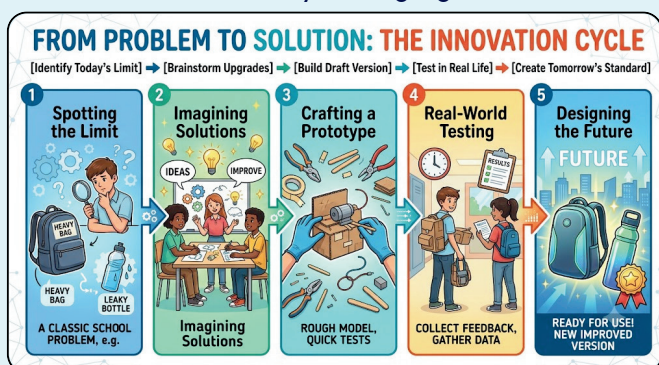
Seeing the world as a prototype means realizing that nothing you see is in its final form.

- **The objects in your hands** are just today's answers to yesterday's questions.
- **The systems around us**, from how traffic flows in our cities to how we manage plastic waste, are ongoing experiments waiting for better solutions.
- **The future is not fixed**; it is constantly being redesigned through small, iterative improvements.

When you adopt this mindset, your perspective shifts instantly. A heavy school bag isn't just a daily annoyance; it's an opportunity for a redesign. A plastic water bottle that leaks isn't a finished product; it's an incomplete design waiting for your idea.

Why Every Object Needs a Future Version

Why can't things just stay as they are? Because the world is constantly changing.



New challenges emerge, climate demands shift, and fresh technologies become available. To keep up, every product, system, and idea must evolve.

Identify Today's Limit



Brainstorm Upgrades



Build Draft Version



Test in Real Life



Create Tomorrow's Standard

This cycle of **design thinking** drives human progress. Think about how we communicate: we went from sending physical letters to rotary phones, to bulky mobile phones, to smartphones, and now to wearable tech. No single stage was the "final" destination – each was simply a prototype for the next step.

Even nature works this way! Evolution is biological prototyping in action: organisms adapt over generations to fit new environments, continually updating their traits to survive and thrive.

Living in "Prototype Mode": The Ultimate Student Mindset

For students, realizing that the world is an unfinished prototype is revolutionary. It changes how you think about learning, problem – solving, and even making mistakes.

1. Mistakes Become Data, Not Failure

If an object is just a draft, then a test that doesn't work isn't a failure – it's just useful feedback telling you what to adjust next.

2. You Don't Need Permission to Innovate

You don't have to wait until you graduate or become a professional engineer to create solutions. Since the current versions of everyday tools are imperfect, your fresh eyes and creative ideas are just as valuable as anyone else's.

3. "Jugaad" and the Power of Resourcefulness

In India, the spirit of practical innovation shines through **jugaad** – making quick, cost – effective models out of whatever materials are on hand. From rural water pumps to space missions at ISRO, seeing possibilities in simple resources proves that big innovations start with humble first attempts.

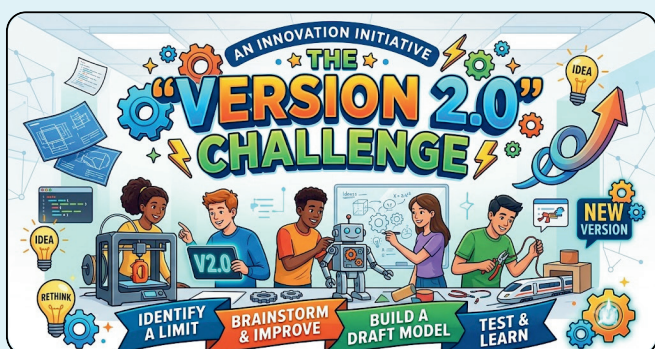
Did You Know?

Thomas Edison made thousands of draft versions before perfecting the electric lightbulb, and early aircraft went through dozens of redesigns after failed test flights.

Breakthroughs aren't sudden magic – they come from viewing the world as something you can constantly tweak and refine.

DIY: Upgrade the World Around You!

Ready to look at your surroundings like an innovator? You don't need fancy tools, just curiosity and basic materials:



The "Version 2.0" Challenge

Pick one object you use every single day – a pencil box, a desk organizer, or your water bottle.

1. List three things about it that could be improved.
2. Grab scrap cardboard, tape, or paper clips.
3. Build a quick, physical "Version 2.0" model that fixes those issues.

For Teachers: Cultivating a Prototype Culture in Classrooms

Teachers can help students build this dynamic worldview through simple daily habits:

- **Reframe Problems as Drafts:** Encourage students to view incomplete assignments or flawed science experiments as "work – in – progress drafts" rather than dead ends.
- **Run 15 – Minute Redesign Hacks:** Give groups everyday objects (like a paper coffee cup or a ruler) and challenge them to prototype three new uses or design improvements.
- **Celebrate the Journey:** Display early sketches, rough models, and discarded ideas alongside finished projects during science fairs.

You Are the Co – Creator of Tomorrow

The idea that "the world is a prototype" is an open invitation. It means the world isn't something that just happens to you – it is something you can actively help design.

Every chair you sit on, every app you tap, and every tool you use is waiting for its next version. Pick a problem, grab some materials, build your first rough draft, and start shaping the future today!

Life - Saving Slippers From Snake Bites

The Life - Saving Slippers project is introducing a low - cost, eco - friendly solution to protect individuals from venomous snake bites, particularly at night. The slippers, equipped with vibrating motors and LED lights powered by small batteries, create continuous vibrations that scare snakes away. These LED lights provide visibility in dark areas, preventing accidental encounters.



P. Navya Sri
9th Class

The project aims to find a safe and eco - friendly solution to protect students and staff from snake bites, especially in rural or forested areas. The project was inspired by a tragic incident where a student was bitten by a poisonous snake while walking to a dormitory, and the snake was later killed by staff.

(Source: GYS Avishkar Awards 2025 Booklet)

[Link for the project's video presentation](https://www.youtube.com/@GETAYoungScientist)
[YouTube.com/@GETAYoungScientist](https://www.youtube.com/@GETAYoungScientist)

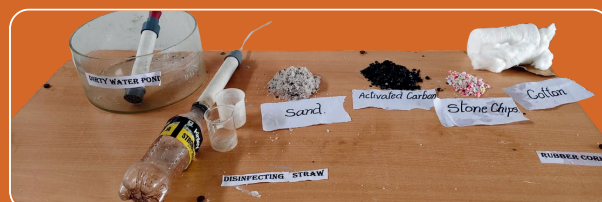
Innovative Disinfecting Straw

The Innovative Disinfecting Straw is a water purification device that uses a hollow fiber membrane filter to remove bacteria, viruses, and contaminants from water, making it safe to drink. The straw, made of materials like a filter, plastic housing, end caps, a drinking straw, and a pre - filter (optional), is designed to protect against diseases caused by E. coli, Giardia, cryptosporidium, cholera, typhoid, and other waterborne pathogens.

It requires no electricity or chemicals and operates entirely mechanically, relying on suction through the straw to filter water instantly. This innovative solution is crucial, as millions of people worldwide are exposed to unsafe drinking water due to pollution from industrial, agricultural, and domestic sources.



A. Saranya
9th Class



(Source: GYS Avishkar Awards 2025 Booklet)

[Link for the project's video presentation](https://www.youtube.com/@GETAYoungScientist)
[YouTube.com/@GETAYoungScientist](https://www.youtube.com/@GETAYoungScientist)

Cover Story

Innovations for Smart Villages



Rethinking Villages as Innovation Hubs. India lives in its villages. A large part of the population still resides in rural areas, where agriculture, traditional livelihoods, and community life form the backbone of society. However, villages also face challenges such as limited access to quality education, healthcare, clean water, reliable electricity, and digital connectivity. These challenges are not just problems; they are opportunities for innovation.



The idea of **Smart Villages** is about transforming rural areas using science, technology, and sustainable practices. It does not mean turning villages into cities, but rather improving quality of life while preserving local culture and environment. Smart villages aim to provide modern facilities, economic opportunities, and better living standards through innovative solutions.

This concept has gained importance in recent years, especially with initiatives by the Government of India and programs like rural electrification, digital India, and sustainable agriculture missions. Scientists, engineers, entrepreneurs, and Students are all contributing to this transformation. Smart villages represent a powerful idea: innovation is not limited to big cities or high - tech labs.

Real - world problems in villages need creative, practical, and affordable solutions, and young minds can play a major role in solving them.

Understanding Smart Villages

A smart village is a rural community that uses technology and innovation to improve living conditions and create sustainable development. It focuses on key areas such as energy, water, agriculture, education, healthcare, and connectivity.



Why do we need smart villages?

Because rural development is essential for national progress. When villages prosper, the entire country benefits. Reducing migration to cities, improving livelihoods, and ensuring equitable development are some of the main goals.

Where is this initiative implemented?

Smart village initiatives are implemented across India, in states like Andhra Pradesh, Gujarat, Maharashtra, and Tamil Nadu, where pilot projects have demonstrated significant improvements.

The people involved include government agencies, NGOs, scientists, engineers, entrepreneurs, and local communities.

Students and teachers also play a crucial role in spreading awareness and developing innovative ideas.

How Smart Villages Work?

Smart villages use a combination of technologies and methods to address local challenges.

In **energy**, solar panels and microgrids provide reliable electricity, reducing dependence on traditional power sources. In agriculture, techniques like drip irrigation and soil sensors help farmers use water efficiently and increase crop yield.

Digital connectivity plays a major role. Internet access enables online education, telemedicine, and e - governance services. Farmers can access weather updates, market prices, and expert advice through mobile apps.

Healthcare is improved through telemedicine, where patients consult doctors remotely. This is especially important in areas where medical facilities are limited.

Water management systems, such as rainwater harvesting and smart pumps, ensure sustainable use of resources.

These technologies show how science can be applied to solve real-life problems in rural areas.

1. Smart Agriculture

Agriculture is the backbone of rural India, and innovation in this sector is essential for smart villages.

Smart agriculture involves using technology to improve productivity and sustainability.

Soil testing helps farmers understand nutrient levels and choose the right fertilizers. Sensors and mobile apps provide real - time data on weather and soil conditions.



Drones are being used to monitor crops and spray pesticides efficiently. Organic farming practices are also gaining popularity, promoting healthier food and environmental protection. These innovations help farmers reduce costs, increase yield, and protect natural resources.

2. Digital Villages: Connecting the Unconnected

Digital connectivity is a key component of smart villages. Programs like Digital India aim to provide internet access and digital services to rural areas.

Digital literacy programs teach villagers how to use smartphones, computers, and online platforms. This opens up opportunities for education, employment, and entrepreneurship.

3. Water Innovation

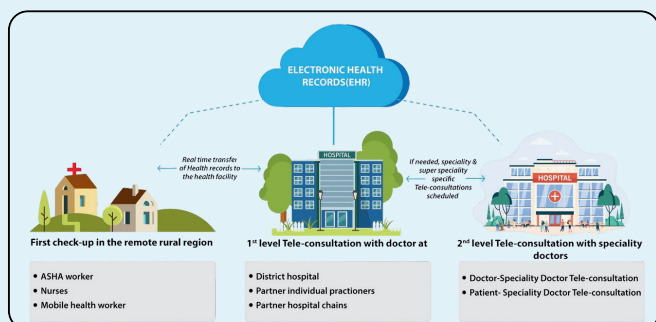
Water is one of the most critical resources in rural areas. Smart villages focus on efficient water management.

Rainwater harvesting collects and stores rainwater for future use. Drip irrigation ensures that crops receive the right amount of water without wastage.

Community water purification systems provide safe drinking water. Restoring ponds and lakes helps maintain groundwater levels. These solutions are simple yet powerful examples of innovation.

4. Smart Healthcare

Healthcare access is a major challenge in rural areas. Smart villages use technology to bridge this gap. Telemedicine allows patients to consult doctors through video calls. Mobile health vans bring medical services to remote locations.



Digital health records help track patient history and improve treatment. These innovations ensure that healthcare is accessible and affordable.

5. Education Revolution

Education is the key to development. Smart villages focus on improving access to quality education.

Digital classrooms, online learning platforms, and solar - powered schools are transforming rural education.



Students can now access the same resources as those in cities, reducing the gap between rural and urban education.

For young learners, this creates new opportunities to explore science and innovation.

6. Rural Entrepreneurship and Innovation



Smart villages encourage entrepreneurship. Local businesses, self-help groups, and startups create economic opportunities.

Digital platforms help farmers and artisans sell their products directly to markets, increasing income.

Students can play a role by developing ideas that support local businesses and improve livelihoods.

What Makes a Village “Smart”? Beyond Technology

When we hear the word “smart,” we often think of technology. But a smart village is much more than that. It is a place where people have access to basic needs, opportunities to grow, and systems that support sustainable living.

A smart village ensures clean drinking water, proper sanitation, reliable energy, quality education, and accessible healthcare. It also promotes economic development through small businesses, agriculture, and local industries.



Most importantly, a smart village empowers its people. It encourages participation, collaboration, and innovation within the community. This means that technology is just a tool, the real goal is improving lives.

The Science Behind Smart Villages

Smart villages are built on scientific principles that make systems efficient and sustainable.

Solar panels convert sunlight into electricity using photovoltaic cells. This provides clean energy without pollution. **Drip irrigation systems** use controlled water flow to reduce wastage and improve crop yield. **Biogas plants** convert organic waste into fuel, providing an eco - friendly energy source for cooking and lighting. **Water purification systems** use filtration and chemical processes to make water safe for drinking. These technologies show how science can be applied in practical ways to solve everyday problems.

Energy is the backbone of development. In many villages, lack of reliable electricity affects education, healthcare, and daily life.

Smart villages use renewable energy sources like solar and wind power. Solar microgrids can supply electricity to entire communities, while LED streetlights reduce energy consumption.

Biogas plants use agricultural waste to produce fuel, reducing dependence on traditional sources.

These innovations not only provide energy but also protect the environment.



Success Stories

India has several inspiring examples of smart villages. Punsari is known for its advanced infrastructure, including Wi-Fi connectivity, CCTV surveillance, and modern facilities.

Hiware Bazar transformed from a drought - prone village into a prosperous community through water management and collective effort. These success stories show that innovation, leadership, and community participation can create lasting change.

Role of Students in Building Smart Villages

Students are the future innovators of smart villages. They can observe problems in their communities and develop creative solutions.

Simple ideas, such as designing low - cost water filters or creating awareness campaigns, can have a big impact.

Participation in science fairs, innovation challenges, and community projects helps students develop practical skills and confidence.

DIY Activities

Students can start with simple projects that address local issues.

Building a **water filter** using sand and charcoal demonstrates how clean water can be achieved.

Creating a **solar cooker** shows how renewable energy can be used for cooking.



Designing a **rainwater harvesting model** helps understand water conservation.

Classroom Activities for Teachers

Teachers can organize group discussions on rural challenges and solutions. Students can work on projects to design smart village models.

Field visits to nearby villages can provide real – world insights. Inviting local experts or community leaders can enhance learning.

Did you know?

Solar energy is increasingly used in villages, reducing dependence on traditional power sources.

Future Impact: Toward a Smart and Sustainable India

The future of India depends on the development of its villages. Smart villages can reduce inequality, improve livelihoods, and create sustainable communities.

Emerging technologies like artificial intelligence, renewable energy, and IoT will further enhance rural development.

This is an opportunity to contribute to nation – building through innovation.

Conclusion

Innovation Begins in Every Village. Smart villages are not just a concept, they are a vision for a better future.

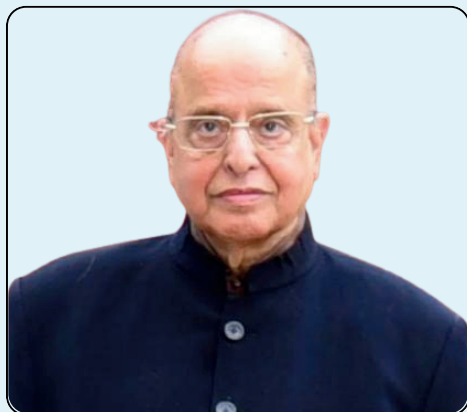
They show how science and technology can transform lives and create opportunities.

This is an invitation to think creatively and act responsibly.

Every problem is an opportunity for innovation. By working together, we can build a smarter, stronger, and more inclusive India.

K. Kasturirangan

Padma Shri, Padma Bhushan, Padma Vibhushan



(Oct 24, 1940 - Apr 25, 2025)

Dr Krishnaswamy Kasturirangan was an eminent Indian astrophysicist, space scientist, and education reformer. As the **5th Chairman of ISRO (1994 - 2003)**, he played a pivotal role in strengthening India's space programme through satellite development, launch vehicle technology, and the early planning of **Chandrayaan - 1**. He was also the chief architect of the **National Education Policy (NEP) 2020**.

Major Scientific Contributions

- Led the development of **PSLV, GSLV**, and the **INSAT** and **IRS** satellite programmes.
- Project Director of **Bhaskara - I** and **Bhaskara - II**, India's first Earth observation satellites.
- Strengthened **remote sensing** for agriculture, disaster management, environmental monitoring, and resource mapping.
- Played a key role in planning **Chandrayaan-1**, India's first Moon mission.
- Chaired the committee that drafted the **National Education Policy (NEP) 2020**.

Leadership Roles

- Chairman, **ISRO (1994 - 2003)**.
- Director, **ISRO Satellite Centre**.
- Director, **National Institute of Advanced Studies (NIAS)**.
- Member of the **Rajya Sabha, Space Commission, and Planning Commission**.

Major Awards & Honours

- **Padma Shri, Padma Bhushan, and Padma Vibhushan**.
- Fellow of the **Indian National Science Academy** and the **Indian Academy of Sciences**.
- Received numerous national and international honours for contributions to space science.

Legacy & Inspiration

Dr Kasturirangan transformed India's space programme, laid the foundation for lunar exploration, and revolutionised education through **NEP 2020**. His career demonstrated how science, technology, and policy can work together to drive national development, inspiring generations of scientists, engineers, and educators.

Conclusion

Dr K. Kasturirangan is remembered as a visionary scientist and nation builder who connected space science with national development and education reform. His legacy continues in ISRO missions, India's education system and Global space collaborations.

Structural Engineering Research Centre (SERC)

CSIR - Structural Engineering Research Centre (SERC), established in **1965** under **CSIR**, is India's premier institute for structural engineering research. Based in **Chennai**, it develops safe, durable, and disaster - resilient infrastructure, including earthquake, cyclone, and blast - resistant structures. Equipped with world - class facilities such as the **Wind Engineering Laboratory, Seismic Testing Centre, and Tower Testing Station**, SERC advances structural safety, infrastructure development, and disaster resilience through cutting - edge research and testing.

Objectives

SERC conducts application - oriented research in structural design, rehabilitation of ageing infrastructure, advanced construction materials, and disaster - resistant engineering. It also provides consultancy, structural proof - checking, and technical support for major national infrastructure projects.

Significance in Indian Research Space

As India's leading structural engineering research institute, SERC supports government departments, defence organisations, industries, and public agencies in developing safe and reliable infrastructure. Its expertise has contributed to bridges, metro systems, power plants, offshore structures, industrial facilities, and other critical national projects.

Collaborations

SERC collaborates with **Central and State Governments, DRDO**, industries, universities,

and international research organisations. These partnerships promote technology development, joint research, training programmes, and knowledge sharing in structural engineering.



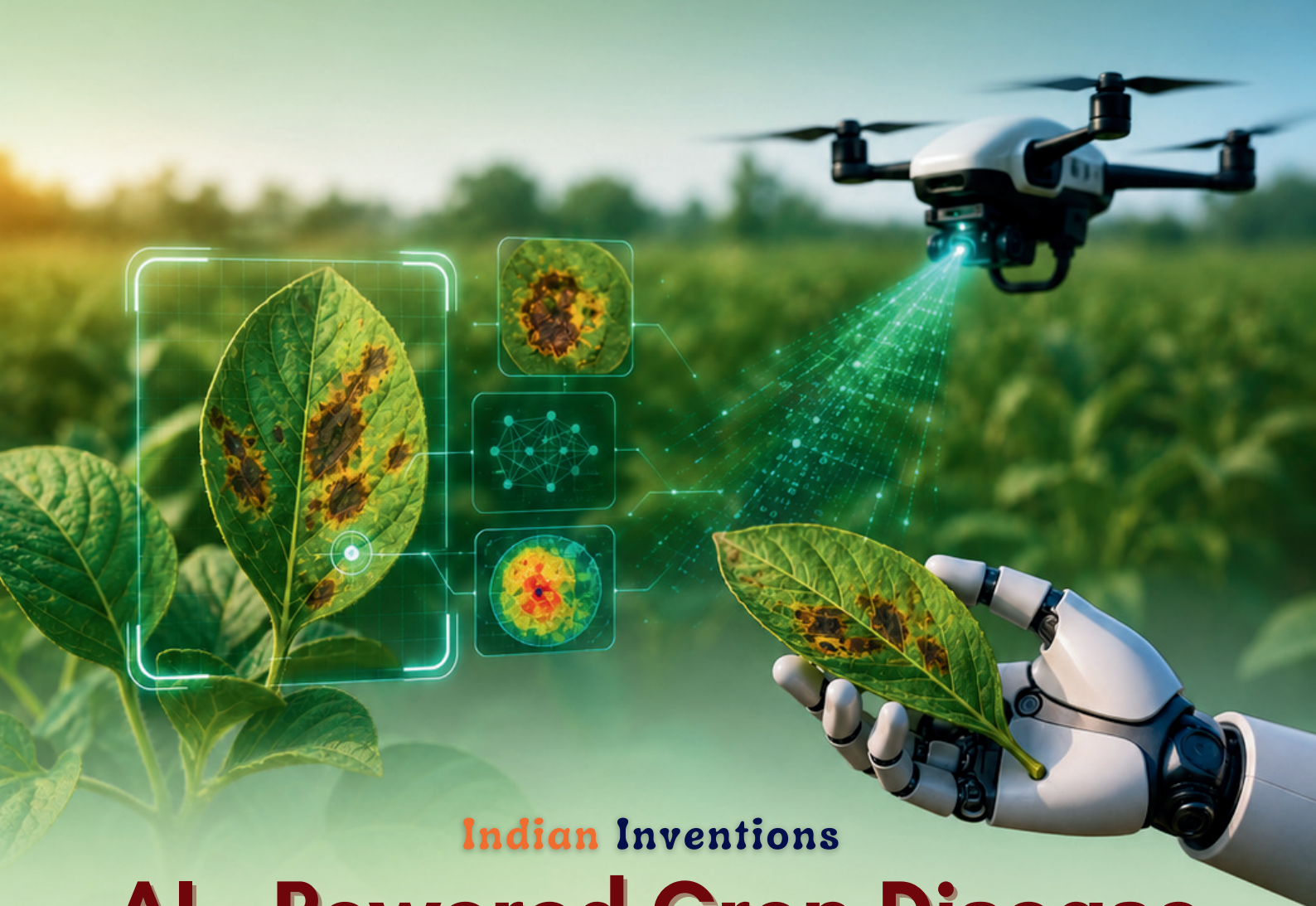
Achievements

SERC has made significant contributions to earthquake engineering, blast-resistant structures, wind engineering, and structural health monitoring. It operates one of India's finest tower testing facilities, publishes a structural engineering journal since 1973, and has developed several patented technologies and licensed innovations for industry.

Future Vision

SERC is advancing **smart infrastructure** using AI, sensors, and digital monitoring while promoting sustainable construction materials and disaster-resilient technologies. Through continuous innovation, it is building safer, smarter, and more sustainable infrastructure for India.





Indian Inventions

AI - Powered Crop Disease Detectors

Technology has transformed many areas of human life, and agriculture is no exception. One of the most exciting developments in recent years is the use of **Artificial Intelligence (AI)** in farming. Among these innovations, AI - powered crop disease detectors are helping farmers identify **plant diseases** quickly and accurately.

While it may seem like a modern technological tool, it reflects a long - standing human effort to protect crops and improve food production.

AI - powered crop disease detection systems use Advanced computer programs and Machine learning techniques to analyse images of plants and identify signs of disease.

The Origin of the Idea

Traditionally, farmers relied on experience and observation to detect **crop diseases**. They would examine leaves, stems, and fruits for unusual spots, colours, or patterns. However, this method required deep knowledge and was not always accurate, especially for new or less experienced farmers.

With the development of **Artificial Intelligence** and image recognition technology, scientists and researchers began creating systems that could automatically detect diseases from photographs of crops. These systems were trained using thousands of images of healthy and infected plants.

Learning Through Technology

AI - powered crop disease detectors are not just tools for farming; they are also powerful learning systems. They continuously improve by analysing more data and learning from patterns.

For example, the system can identify early signs of disease that may not be visible to the human eye. It can suggest possible treatments or preventive measures.

How the Technology Spread Around the World?

As smartphones and internet access became more widespread, AI - based farming tools began reaching farmers across the globe. Many mobile applications were developed to help farmers simply take a picture of a plant and receive instant results.

Governments, agricultural organisations, and technology companies started promoting these tools to support farmers, especially in developing countries. Today, **AI - powered crop disease detectors** are used in countries like India, the United States, and China, helping farmers improve productivity and ensure food security.

Why AI - Powered Crop Disease Detectors are an Innovation?

This technology is a major innovation because it combines agriculture with advanced digital tools to solve real - world problems. It demonstrates several important ideas:

- Technology can improve **traditional practices**.
- Early detection can prevent major losses.
- Simple tools like smartphones can deliver **powerful solutions**.

Modern agriculture is increasingly using such smart technologies, often referred to as **“smart farming”** or **“precision agriculture.”**

Classroom Activity

Teachers can help students understand this concept through an engaging activity.

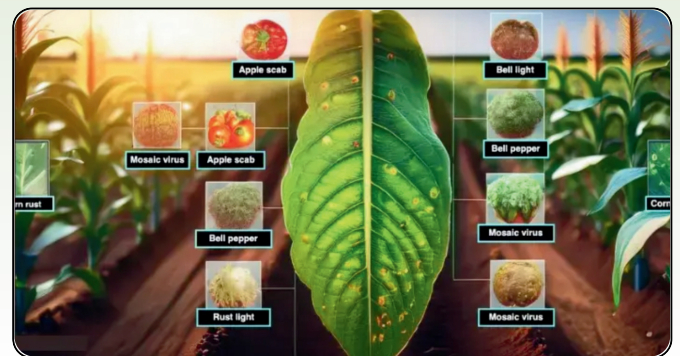
Ask students to:

- Collect pictures of healthy and diseased plants
- Try to identify visible differences between them
- Design a simple app idea that could help farmers detect diseases

Students can then present their ideas and discuss how technology can improve agriculture. This activity encourages observation, **creativity**, and **problem - solving** skills.

Conclusion

AI - powered crop disease detectors are more than just technological tools. They represent a new way of combining knowledge, innovation, and practical application to solve important problems.



This powerful innovation reminds us that the **future of farming** lies in making it smarter, more efficient, and more accessible for everyone.



Innovation Training Module

SCAMPER

Have you ever wished your school bag had a built - in phone charger? Or wondered why your water bottle couldn't keep itself clean? Maybe you've thought about a bicycle that folds into a backpack or a pencil that never becomes too short to use.

If yes, congratulations - you are already thinking like an innovator!

Many people believe that innovation means inventing something completely new. But in reality, some of the world's greatest inventions were simply improvements to existing ideas. Smartphones were not the first phones. Electric cars were not the first cars.

Even online learning is an improved version of classroom learning.

The secret is learning how to improve what already exists.

One of the best tools for doing this is called **SCAMPER**.

What is SCAMPER?

SCAMPER is a creative thinking technique that helps you generate new ideas by asking seven simple questions about an existing product, service, or process. Instead of waiting for inspiration to strike, SCAMPER gives your brain a roadmap for creative thinking.

Each letter in the word "SCAMPER" represents a different way of improving an idea.

S – Substitute

C – Combine

A – Adapt

M – Modify

P – Put to Another Use

E – Eliminate

R – Reverse or Rearrange

By answering these seven questions, you can transform an ordinary object into something smarter, easier to use, and more useful.

Let's explore each step.

S – Substitute

Ask yourself:

What can I replace?

Can a material, part, person, or process be changed?

For example, plastic shopping bags can be substituted with cloth bags to reduce pollution.

Imagine your school desk. Instead of wood, could it be made from recycled plastic? Could ordinary chalk be replaced with dust - free chalk to keep classrooms cleaner?

Sometimes, changing just one part creates a much better product.

C – Combine

Ask:

Can I combine two ideas into one?

Many successful products combine different functions.

A smartwatch combines a watch, fitness tracker, alarm, calculator, and phone notifications into one device.

What if your school ID card also worked as your library card and attendance card?

What if your umbrella had a small torch attached to it for walking safely at night?

Combining ideas often makes life simpler and more convenient.

A – Adapt

Ask:

Can I borrow an idea from somewhere else?

Nature is one of the greatest teachers of innovation.

Scientists developed Velcro after observing how burr seeds stuck to animal fur.

Bullet trains in Japan were redesigned after studying the beak of the kingfisher bird, making them faster and quieter.

You can also adapt ideas from everyday life.

Could the wheels of a suitcase inspire an easier way to carry heavy school bags?

Could a restaurant token system help organise the school canteen queue?

Innovation often begins by learning from something that already works well.

M – Modify

Ask:

Can I change the size, shape, colour, or appearance?

Sometimes a small modification creates a big improvement.

Imagine a ruler that bends without breaking.

A water bottle could become collapsible so it takes less space when empty.

School benches could be adjustable to suit students of different heights.

You are not changing the purpose of the object – just making it work better.

P – Put to Another Use

Ask:

Can this be used in a completely different way?

Many everyday objects have more than one purpose.

Old newspapers become gift wrapping.

Plastic bottles become plant pots.

Shipping containers become classrooms, homes, and offices.

Think about an old bicycle tyre.

Could it become a garden swing?

Could it protect young trees?

Could it become playground equipment?

Looking at familiar objects differently is an important innovation skill.

E – Eliminate

Ask:

What can I remove to make it simpler?

Many great products became successful because unnecessary features were removed.

Think about a school timetable app.

Does it really need ten different menus, or could it work with just three?

Could a pen have fewer parts so it costs less and is easier to recycle?

Could school forms become shorter and easier to fill?

Sometimes, **less is more**.

Removing unnecessary complexity often makes products better.

R – Reverse or Rearrange

Ask:

Can I change the order or do things differently?

Instead of asking, "How is this usually done?" ask, "What if we did the opposite?"

Restaurants usually bring food after you order.

What if students could pre – order lunch before school starts to reduce waiting time?

Most backpacks open from the top.

Could one open completely like a suitcase for easier packing?

Changing the sequence of steps often reveals new possibilities.

Let's Try SCAMPER!

Choose an everyday object like a pencil.

Now ask yourself:

- **Substitute:** Can wood be replaced with recycled paper?
- **Combine:** Can it include an eraser and ruler?
- **Adapt:** Can it work like a mechanical pencil?
- **Modify:** Can it become triangular for a better grip?
- **Put to Another Use:** Can used pencils become plant markers?
- **Eliminate:** Can sharpening be removed completely?
- **Reverse:** Can the writing tip appear from both ends?

Just one object can generate dozens of innovative ideas!

Imagine what you could do with bicycles, classrooms, school buses, water bottles, or playgrounds.

SCAMPER in Everyday Life

Innovation is not only for scientists or engineers.

You can use SCAMPER to improve:

- Your study routine
- School projects
- Science models
- Community problems
- Household chores
- Sports equipment
- Gardening methods
- Classroom activities

Whenever you notice something inconvenient, don't complain.

Ask a SCAMPER question instead.

Activity for Young Scientists

Choose any object around you.

It could be:

- **A school bag, A dustbin, A notebook, A chair, A lunch box or A bicycle**

Draw a table with seven columns labelled SCAMPER.

Write one improvement idea under each heading.

Challenge yourself to create **at least seven new ideas** from just one object.

You may be surprised at how creative your mind can be!

Every Innovation Starts with a Question

Innovation is not about having magical ideas.

It is about asking better questions.

SCAMPER teaches us that creativity is a skill anyone can learn. By looking at familiar objects in new ways, we discover opportunities to improve the world around us.

The next time you use something at school or home, don't just ask, "**What is this?**"

Ask, "**How could this be better?**"

That simple question could be the beginning of your next great invention.

Y E N N D A Y S E I A L C D
Y A I C O N E C S R M C Y I
R D E T R D I G P M S O C M
R U D R Q R U R H L I I L A
S T T R C I E B E G R A A R
I R U L A D N I R C P H L Y
E C E O N D P L E S B L E P
R R P I A C L G R H R I I E
A L L M H C L D I O B U C I
R Y E G A A C H E X A G O N
C T R I A N G L E G L M A L
L A R E T A L I R D A U Q A
C C A G P O E N H O L N U H
U R E C T A N G L E M M H S

Word Search 2607 Names of 2D and 3D Shapes

PRISM	TRIANGLE	QUADRILATERAL
CONE	CIRCLE	CYLINDER
HEXAGON	SPHERE	RECTANGLE
PYRAMID	CUBOID	

(Answers on Back Cover Inside)

Indian Scientist

C. N. R. Rao

Padma Vibhushan (1985), and Padma Shri (1974)



(Born 30 June 1934)

Prof. C. N. R. Rao is a world – renowned Indian chemist and materials scientist, famous for his pioneering work in solid – state chemistry and nanomaterials. He is often called the **“Father of Solid State Chemistry in India”** and is one of the most respected scientists globally.

He has worked extensively in:

- Chemistry of Materials
- Nanoscience
- Transition metal oxides
- Spectroscopy and molecular structure

He has also played a major role in shaping India’s science policy and research institutions. Became a professor at the Indian Institute of Science (IISc) at a very young age and quickly rose as a leading researcher.

Major Scientific Contributions

- Pioneered solid – state chemistry in India, advancing research on metal oxides, crystal structures, and phase transitions.
- Made landmark contributions to materials chemistry, nanoscience, graphene, superconductors, and transition metal oxides.

- Published 1,800+ research papers and 58 books, making him one of the world's most cited chemists.
- Played a key role in establishing IISERs, promoting India's Nano Mission, and strengthening scientific research infrastructure.

Leadership Roles

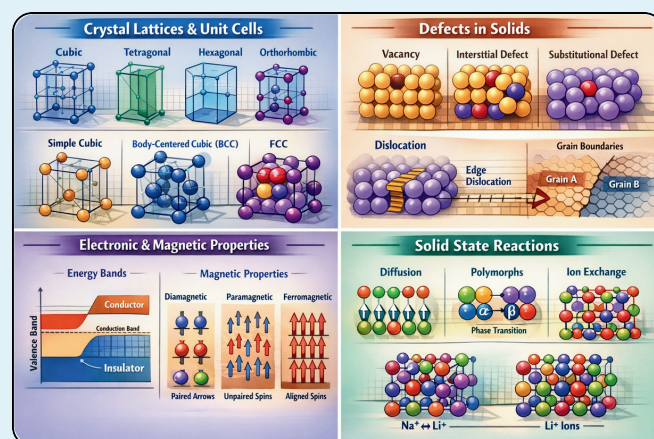
Founder and Chairman of JNCASR, Bengaluru, and Scientific Advisory Council to the Prime Minister.

Major Awards & Honours

Recipient of the **Royal Medal, Hughes Medal, Dan David Prize, Von Hippel Award, and Legion of Honour (France), Bharat Ratna (2014), Padma Vibhushan (1985), and Padma Shri (1974)**. Honorary doctorates from 80+ universities and Fellow of leading scientific academies worldwide.

Legacy & Inspiration

Prof. C. N. R. Rao pioneered materials science and nanotechnology in India, strengthening scientific research through his lifelong commitment to science and education.



Indian Institute of Astrophysics (IIA), Bengaluru

The **Indian Institute of Astrophysics (IIA)**, headquartered in **Bengaluru**, is India's premier institute for astronomy and astrophysics. Tracing its origins to the **Madras Observatory (1786)**, it is an autonomous institute under the Department of Science & Technology (DST). IIA conducts world - class research in astronomy, astrophysics, and space science, contributing to major missions such as Astrosat and Aditya - L1.

Objectives

- Conduct research in solar physics, stellar astronomy, cosmology, and astronomical instrumentation.
- Train future scientists through PhD and Integrated M.Tech - PhD programmes.
- Develop advanced telescopes and space payloads for national and international missions.

Significance

- One of India's leading centres for astronomy and space science.
- Contributes to Astrosat, Aditya - L1, and other major space missions.
- Supports research in solar activity, space weather, and cosmic exploration.

Collaborations

Collaborates with ISRO, NASA, ESO, global universities, and the Thirty Meter Telescope (TMT) project.

Achievements

- Developed the Ultra - Violet Imaging Telescope (UVIT) for Astrosat.

- Established the Vainu Bappu Observatory and the Indian Astronomical Observatory, Hanle.
- Recognised for contributions to solar physics, stellar spectroscopy, and gamma-ray astronomy.

Future Vision

The Indian Institute of Astrophysics regularly hosts Founders' Day celebrations, seminars, and international conferences, fostering global scientific collaboration. A major milestone was the establishment of the Hanle Dark Sky Reserve, promoting astronomy tourism and advanced research, while its Golden Jubilee in 2021 marked 50 years of autonomy and excellence.

Looking ahead, the institute aims to expand into AI - driven astrophysics and big - data astronomy, enhance space payload development or missions beyond Astrosat, and strengthen India's leadership in multi - wavelength astronomy and cosmology on the global stage.





S&I Article

The Science of Scents

Have you ever walked past a bakery and felt instantly hungry, even if you just ate? Or caught a whiff of a familiar perfume and felt transported back in time to a specific day, person, or place?

Smell is one of our most powerful yet underrated senses. It's invisible, yet its connection to our emotions and memories can last a lifetime. Welcome to the world of **olfaction** - the science of smell - where biology, chemistry, and neuroscience meet right inside your nose!

How We Smell: A Direct Hotline to the Brain

The journey begins when tiny, invisible particles called **odor molecules** float off things like flowers, spices, or rain-soaked soil and travel into your nose.

High up inside your nose, millions of microscopic receptors wait to catch these molecules. Think of these receptors like unique locks and keys: each odour molecule fits a specific receptor, generating a tiny signal that travels directly to your brain.

What makes smell truly special is where these signals go:

Odor Molecules → Nasal Receptors →
Olfactory Nerve → Limbic System (Emotion & Memory)

Unlike sight or sound, smell bypasses normal sensory processing hubs and travels straight to the **limbic system** - the part of the brain that handles emotions and memories. That direct hotline is why a single scent can instantly spark a vivid, emotional memory from years ago.

Take **the petrichor** - **that** wonderful, earthy smell when rain hits dry soil after a hot summer. For millions in India, that single scent instantly brings back happy memories of monsoons, paper boats, and school holidays. That's not magic; it's your brain's direct wiring in action!

Scents in Our Daily Lives

India is full of amazing aromas, making it the perfect place to explore smell science:

- **Spices & Food:** The rich aromas of cardamom, turmeric, and cumin release flavour signals that make eating an incredible sensory experience.
- **Flowers & Perfumes:** Vibrant flower markets filled with jasmine and roses supply natural essential oils used for traditional perfumes (attars) and rituals.
- **Calming Aromas:** Scents like lavender and eucalyptus help relax our nervous system and reduce stress.

Cool Tech Inspired by the Nose

Understanding smell isn't just cool science - it inspires real - world innovation:

- **Electronic Noses:** Sensors designed like human noses can detect dangerous gas leaks, monitor air pollution, and test food quality.
- **Medical Screening:** Doctors are studying how changes in a person's sense of smell can help spot diseases like Alzheimer's early.
- **Safety Features:** Cooking gas (LPG) has no natural scent, so a smelly chemical is added to help us spot dangerous leaks immediately.

Mind - Blowing Scent Facts!

- **Unforgettable:** Humans can remember smells with **65% accuracy after a full year**, while visual memories fade much faster!
- **Super Sniffers:** Dogs have a sense of smell thousands of times stronger than ours!
- **Newborn Instincts:** Babies can recognise their mother's scent within just a few days of being born!

The Future of Smell Science

The future of scent technology is full of wild possibilities. Imagine playing virtual reality video games where you can actually smell the virtual forest you are exploring, or smart rooms that release focus - boosting scents while you study!

Smell proves that invisible things can have a huge impact on our lives.

So next time you step outside after rain or walk past delicious food, take a deep breath and appreciate the amazing science working right inside your nose!



**SURFACE
TO AIR MISSILES**



NAVAL GUN SYSTEMS



**CLOSE-IN
DEFENCE SYSTEMS**



TORPEDO SYSTEMS



INDIAN
INNOVATION
INDIAN OCEANS
INDIA SECURES

Indian Inventions

Indigenous Aircraft Carrier Weapons Systems

Imagine a giant city floating on the sea, packed with fighter jets, missiles, radars, helicopters, and advanced communication systems, all protecting a nation. This “floating airbase,” called an aircraft carrier, is one of the most powerful and complex machines ever built. It brings together many fields of science and engineering into one massive warship.



India has entered a new era of technology by developing indigenous aircraft carrier weapon systems, designed and built within the country using local knowledge and industries.

What Is an Aircraft Carrier?

An aircraft carrier is a huge naval warship that works like a moving airport at sea, carrying fighter jets, helicopters, radars, weapons, and thousands of crew. It helps a country protect its sea borders, guard trade routes, carry out rescue missions, and defend far from the mainland, especially important for a coastal nation like India. Unlike ordinary ships, an aircraft carrier is a high - tech platform that uses many fields of science and engineering, and every task on board.

Did You Know

Flight decks are designed like mini airports.

Why does India need Indigenous Aircraft Carrier Weapon Systems?

India is surrounded by the strategically important Indian Ocean, through which major global trade and energy transportation take place.

To strengthen national security and reduce dependence on costly foreign defence systems, India developed indigenous defence technologies with contributions from organizations like DRDO, the Indian Navy, BEL, and Cochin Shipyard Limited.

The Story of INS Vikrant

One of India’s proudest achievements is INS Vikrant, India’s first indigenous aircraft carrier. The ship was designed and built in India using local expertise. It contains thousands of kilometers of electrical cables, powerful engines, sophisticated radars, aviation systems, and modern weapons. INS Vikrant demonstrates India’s growing capability in Naval engineering, Shipbuilding, Systems integration, Defence electronics, and Indigenous manufacturing.

Indigenous Weapon Systems on Aircraft Carriers

Weapon systems on aircraft carriers are not limited to missiles or guns. They include many technologies working together.

Missile Systems

Missiles are among the most important defence systems on aircraft carriers. They protect the ship from enemy aircraft, drones, and missiles. Indian defence scientists have developed advanced missile systems, such as:

Barak Missile System

The Barak missile system is used for air defence. It can detect and destroy incoming threats like enemy aircraft and anti - ship missiles. The system uses Radars, Guidance computers, tracking sensors, and high - speed communication systems.

Radar Systems

Aircraft carriers cannot rely only on human eyesight. They use radar systems to detect aircraft, ships, drones, and missiles from long distances. Radar works using radio waves. The radar sends out signals that bounce off objects and return.

Electronic Warfare Systems

In modern warfare, controlling information is extremely important. Electronic warfare systems help detect, confuse, or block enemy communication and radar systems.

Combat Management Systems

A combat management system acts like the “brain” of the aircraft carrier. It collects information from radars, sensors, satellites, and communication systems and helps commanders make decisions quickly.

Indigenous Sensors and Sonar Systems

Aircraft carriers must monitor both the sky and the underwater environment. Sonar systems help detect submarines and underwater threats. Sonar works using sound waves instead of radio waves. The system sends sound pulses underwater and studies the returning echoes.

Aircraft Carrier Aviation Systems

Aircraft carriers support fighter aircraft and helicopters.



Launching and landing aircraft on a moving ship is one of the most difficult engineering challenges.

DIY Activity: Paper Aircraft Carrier Design

Students can design a paper aircraft carrier using cardboard and paper.

Try to balance:

- Stability, Aircraft parking space and Runway design

This activity teaches:

- Engineering design, Balance and buoyancy and Creative thinking

Classroom Activity for Teachers

Group Discussion Topic:

“Why should India build indigenous defence technology?”

Students can discuss Economic benefits, Scientific growth, National security, and innovation opportunities. This activity improves scientific awareness and critical thinking.

Conclusion

Indigenous aircraft carrier weapon systems represent more than military strength, they showcase India’s scientific and engineering excellence. From radars and missiles to AI and naval engineering, they turn many branches of science into real – world technology.

The success of INS Vikrant proves that Indian experts can build world – class defence systems on their own. This achievement encourages students to dream big, think scientifically, and help the nation progress. Every curious, questioning student becomes part of India’s innovation journey and its scientific future.

Agro Electric Nexus. (Sub Topic: Agriculture)

The research proposes a closed – loop model for sustainable agricultural waste management, replacing open – field burning with resource recovery and value addition. The system uses heat and steam from controlled combustion of crop residues to sterilize agro – waste substrates, improve mushroom yield, and generate electricity and battery storage. It also generates high – quality compost, biogas, and ply sheet production from processed waste fibers.



Charvi More
7th Class



The system integrates principles of microbial sterilization, thermodynamics, electrochemical energy storage, and aerobic decomposition to maximize benefits from a single waste source. The challenge is to design a modular, cost – effective, and easy – to – operate system that converts farm waste into multiple marketable products, creating local employment, improving energy access, and reducing environmental harm.

(Source: GYS Avishkar Awards 2025 Booklet)

[Link for the project's video presentation](#)
[YouTube.com/@GETAYoungScientist](https://www.youtube.com/@GETAYoungScientist)

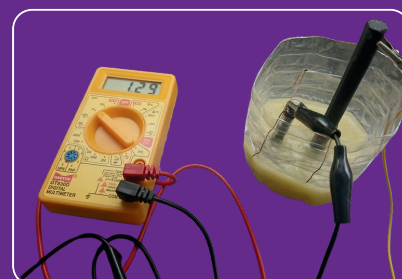
Cellovera

Cellovera is an eco – friendly solution that uses the natural gel inside aloe vera leaves to generate electricity. This innovative solution offers a green, sustainable alternative to traditional AA batteries, which are harmful and nonrenewable. Cellovera uses aloe vera gel as a natural electrolyte, generating up to 9 volts with just one leaf. The setup involves inserting copper and zinc electrodes into the gel, which can be amplified using a step – up transformer for increased output.



Sanchi Bansal
12th Class

Aloe vera has been scientifically observed to produce the highest voltage among plant – based options, making it a promising alternative to traditional batteries. The prototype involves extracting the gel and encasing it in a battery – like container for practical use. As the world increasingly relies on battery – powered gadgets, there is a pressing need for a clean, biodegradable, and renewable alternative that can replace conventional batteries without compromising performance.



(Source: GYS Avishkar Awards 2025 Booklet)

[Link for the project's video presentation](#)
[YouTube.com/@GETAYoungScientist](https://www.youtube.com/@GETAYoungScientist)

Idea Evaluation Matrix



Imagine you have just finished using the **SCAMPER technique** on your school bag. Your notebook is now filled with exciting ideas!

- A bag with built – in solar charging
- A waterproof school bag
- A bag that becomes a chair
- A bag with a GPS tracker
- A self – cleaning school bag
- A foldable backpack
- A bag with cooling compartments for lunch

They all sound interesting. But here comes the big question...

Which idea should you work on first?

Real innovators face this challenge every day. Scientists, engineers, entrepreneurs, and designers often come up with dozens of ideas before deciding which one is worth developing. Instead of choosing randomly, they use a simple method to compare ideas fairly.

One such method is called the **Idea Evaluation Matrix**.

It helps innovators identify the ideas that are **useful, practical, and worth pursuing**.

Why Do We Need an Idea Evaluation Matrix?

A creative mind can generate many ideas, but not every idea is equally good.

Some ideas are exciting but too expensive. Others are easy to build but solve only a small problem. A few ideas may look ordinary but have the greatest impact on people's lives.

The Idea Evaluation Matrix helps you think like an innovator by comparing ideas using clear criteria instead of personal opinions.

Instead of asking, "Which idea do I like?", you ask:

- Which idea solves a real problem?
- Which idea is useful?
- Which idea can I actually build?
- Which idea will help the most people?

This makes your decision smarter and more objective.

Step 1: List Your Ideas

Start by writing down all the ideas you have generated.

For example, if you were improving a school water bottle, your ideas might be:

- Self – cleaning bottle
- Foldable bottle
- Bottle with a built – in water filter
- Bottle that reminds you to drink water
- Bottle with a temperature display

Now it's time to compare them.

Step 2: Choose Your Evaluation Criteria

Innovators compare ideas using a set of questions. Here are five simple criteria that every young scientist can use.

1. Usefulness

Does the idea solve a real problem?

A good innovation makes life easier, safer, healthier, or more comfortable.

2. Originality

Is the idea different from what already exists?

You don't always need a completely new invention, but your idea should offer an improvement or a unique feature.

3. Feasibility

Can the idea actually be built?

Think about the materials, technology, skills, and time needed to make it.

An idea is more valuable if it can become a real product.

4. Cost

Will it be affordable?

Even a brilliant invention may not succeed if it is too expensive for people to use. Innovators always think about making solutions accessible.

5. Impact

How many people will benefit from the idea?

The best innovations often improve the lives of many people, not just a few.

Step 3: Give Scores

Now score each idea on a scale of **1 to 5**.

- **1 = Very Poor**
- **2 = Needs Improvement**
- **3 = Good**
- **4 = Very Good**
- **5 = Excellent**

Let's look at an example 

Idea	Useful	Original	Feasible	Cost	Impact	Total
Self-cleaning bottle	5	4	3	2	5	19
Foldable bottle	4	3	5	4	4	20
Temperature display bottle	3	3	4	3	3	16
Water filter bottle	5	4	4	3	5	21

From this example, the **water filter bottle** receives the highest score, making it the strongest idea to explore further.

Remember, the highest score doesn't always mean the only correct answer. The matrix simply helps you compare ideas in a fair and organized way.

Can the Matrix Be Different?

Yes! Different projects may need different evaluation criteria.

For example:

If you're creating an environmental solution, you might also ask:

- Is it eco - friendly?
- Does it reduce waste?
- Does it save energy?

If you're designing a product for young children, you could include:

- Is it safe?
- Is it easy to use?
- Is it fun?

The evaluation matrix is flexible. You can choose the criteria that are most important for your project.

Why Do Scientists and Innovators Use This Method?

Professional innovators rarely work on their favourite idea immediately.

They first compare different possibilities, collect feedback, test assumptions, and choose the option with the greatest potential.

This saves time, money, and effort.

Imagine spending six months building a product before discovering that nobody actually needs it!

The Idea Evaluation Matrix helps avoid this mistake by encouraging careful thinking before taking action.

Activity: Become an Innovation Judge

Choose one everyday object around you.

It could be:

- A pencil
- A school bag
- A bicycle
- A lunch box
- A notebook
- A classroom desk

Use the **SCAMPER technique** to generate at least **five new ideas**.

Now create your own Idea Evaluation Matrix.

Choose five evaluation criteria and give each idea a score from **1 to 5**. Add the scores and identify your highest – scoring idea.

Finally, ask yourself:

"What could I do to improve this idea even further?"

Remember, innovation is an ongoing journey. Even the best ideas can become better with feedback and improvement.

Every Great Innovation Begins with the Right Choice

Creativity is about generating ideas.

Innovation is about choosing the **right idea** and turning it into reality.

The Idea Evaluation Matrix teaches us that successful innovators do not rely on luck or guesswork. They think carefully, compare options, and make informed decisions based on evidence.

The next time you have many exciting ideas, don't rush to pick your favourite.

Create an Idea Evaluation Matrix, score each idea fairly, and let your best solution rise to the top.

After all, every great invention begins not only with a brilliant idea – but also with a **wise decision**.



**One Club. Two Mentor Teachers.
60 Young Minds. A Home for Innovation.**

To Start the Club Call Us: Ms. Naveena - 9966332456, 9966775534.

Every Wednesday 7 PM GYS Quizzes Online, Browse through the Young Scientist India Magazine, Student Innovations from GYS Knowledge Base and GYS YouTube Playlists.

Achieve, at least, 10 print/digital certificates (winner or participation).

Indian Scientist

A. S. Kiran Kumar

Padma Shri (2014)



(Born October 22, 1952)

A. S. Kiran Kumar is a distinguished Indian space scientist and former **Chairman of ISRO (2015–2018)**. Born in **Hassan, Karnataka, on October 22nd, 1952**, he studied electronics and joined ISRO in the 1970s. He later became the **Director of the Space Applications Centre (SAC)**, playing a key role in advancing India's satellite technology and space applications.

Major Scientific Contributions

- Developed advanced **electro-optical imaging sensors** for Indian satellites.
- Strengthened **remote sensing** for agriculture, water resources, disaster management, and environmental monitoring.
- Contributed to **Mars Orbiter Mission, Chandrayaan-1, INSAT, IRS, and NavIC**.
- Advanced satellite-based communication, weather forecasting, Earth observation, and navigation technologies.
- Promoted the use of space technology for national development and public welfare.

Awards

- **Padma Shri (2014)** – for contributions to science and engineering
- ISRO Outstanding Achievement Award
- Aryabhata Award
- Distinguished Alumni Awards
- Fellow of major scientific academies

Legacy

A. S. Kiran Kumar is remembered as one of India's leading space scientists.

- Played a key role in making India a **global space power**.
- Strengthened satellite applications for everyday use.
- Contributed to successful planetary missions.
- Inspired young scientists and students.
- Promoted the use of science and technology for national development.



Indian Institute of Geomagnetism (IIG), Navi Mumbai

The Indian Institute of Geomagnetism (IIG) is an autonomous research institute under the Department of Science & Technology (DST) dedicated to geomagnetism, geophysics, space physics, atmospheric physics, and plasma physics.

It plays a vital role in studying Earth's magnetic field, space weather, satellite communication, and navigation.

Its origins date back to the Colaba Magnetic Observatory (1826), making IIG the successor to nearly 200 years of geomagnetic research in India.

Objectives

- Conduct research in geomagnetism, space weather, and Earth sciences.
- Maintain geomagnetic observatories and develop magnetic instruments.
- Collect and analyse geomagnetic data.
- Promote scientific training, education, and national & international collaborations.

Significance

- Supports space weather studies, satellite communication, and solar-terrestrial research.
- Contributes to earthquake studies, geophysics, and Earth's magnetic field research.
- Hosts the World Data Centre for Geomagnetism, South Asia's only international geomagnetic data centre.

Collaborations

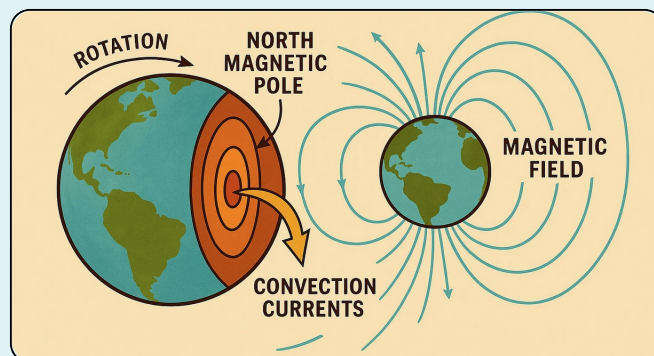
Collaborates with Kyoto University (Japan), University of the Western Cape (South Africa), National Science Council (Taiwan), and other international scientific organisations.

Achievements

- Operates 12 geomagnetic observatories across India.
- Contributes to space weather prediction, magnetic field modelling, ionospheric studies, and Antarctic research.
- Developed a low-cost proton precession magnetometer (Indian Patent, 2016).

Future Vision

IIG is advancing space weather research, AI-driven geophysical analysis, next-generation magnetic instruments, expanded observatory networks, and global collaborations to strengthen Earth and space science research.

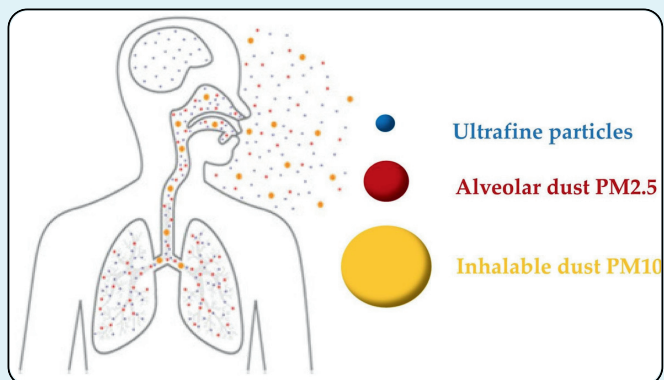


S&I Article

Innovations for Clean Air



Air is invisible, but its impact on our lives is enormous. Every breath we take carries oxygen that keeps us alive, but when the air is polluted, it also carries harmful particles that can affect our lungs, heart, and overall health. In recent years, air pollution has become one of the biggest environmental challenges, especially in rapidly growing countries like India.



Clean air is not just about comfort; it is about survival, health, and quality of life. According to global reports by the World Health Organization, millions of people worldwide suffer from diseases caused by polluted air. In India, cities like Delhi often experience high levels of air pollution due to traffic, industrial emissions, construction dust, and burning of crop residues.

What are “Innovations for Clean Air”?

They are creative solutions – scientific, technological, and community – based – that help reduce pollution and improve air quality.

Why are these innovations important?

Because clean air is essential for healthy living, better learning, and sustainable development.

Where are these innovations needed?

Everywhere from big cities to small villages, from classrooms to industries.

Understanding Air Pollution: The Science Behind It

Air pollution occurs when harmful substances like gases, dust, and smoke mix with the air. These pollutants come from various sources, including vehicles, factories, the burning of fossil fuels, construction activities, and even household cooking methods.

One of the most dangerous pollutants is **PM2.5**, which refers to tiny particles that are smaller than 2.5 micrometres. These particles are so small that they can enter our lungs and even reach the bloodstream.



Air quality is measured using the **Air Quality Index (AQI)**, which indicates how clean or polluted the air is. A higher AQI means poorer air quality and greater health risks.

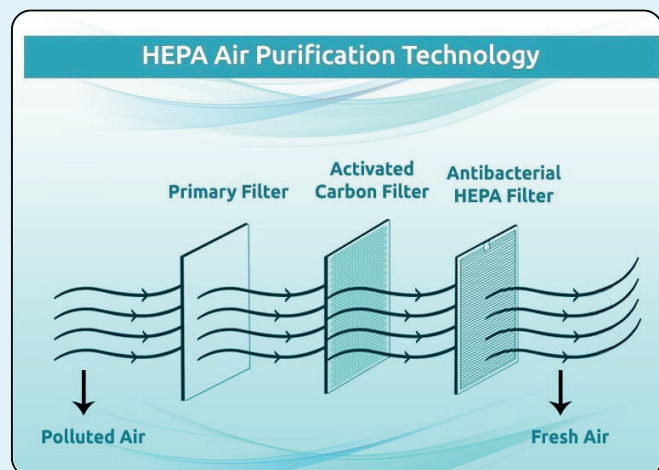
Science helps us understand how these pollutants behave, how they affect health, and how they can be controlled.

How Innovations Help: Methods, Technologies

Innovations for clean air come in many forms.

Some are technological, while others are simple and community – based.

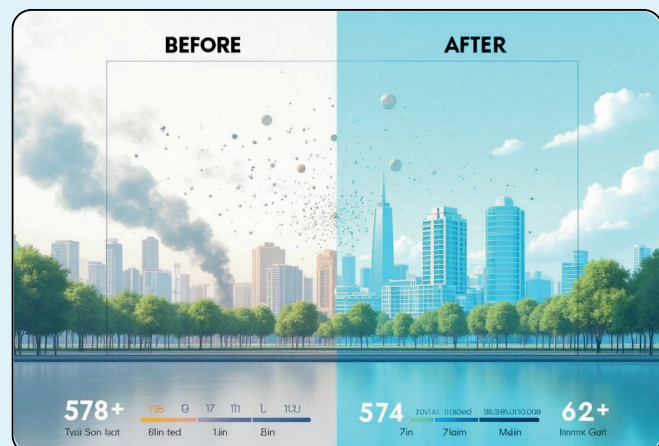
Electric vehicles reduce emissions by replacing petrol and diesel engines with battery – powered systems. Air purifiers use filters like HEPA (High – Efficiency Particulate Air) to remove pollutants from indoor air.



Green buildings use plants, ventilation, and eco – friendly materials to improve air quality. Vertical gardens on buildings can absorb pollutants and produce oxygen.

In some cities, large – scale solutions like smog towers are being tested to clean outdoor air. At the same time, simple innovations like improved cookstoves reduce indoor pollution in rural homes.

Students can also contribute by designing low – cost air filters, planting trees, and spreading awareness.



Advantages and Challenges

Innovations for clean air offer many benefits. They improve health, reduce environmental damage, and enhance quality of life. Cleaner air means fewer respiratory diseases, better concentration in students, and a healthier ecosystem.

Challenges include advanced technologies like electric vehicles and air purifiers can be expensive. Infrastructure for clean energy and pollution control is still developing in many areas.

There is also a need for awareness and behavioural change. People must adopt sustainable practices like using public transport, reducing waste burning, and conserving energy.

Success Stories

India has taken several steps to address air pollution:

- 1.The government has promoted electric mobility through policies encouraging electric vehicles and charging infrastructure. Cities are introducing electric buses to reduce emissions.
- 2.The **smog tower** installed in Delhi is an experimental project aimed at reducing pollution levels in specific areas.
- 3.The Pradhan Mantri Ujjwala Yojana has provided LPG connections to millions of households, reducing indoor air pollution caused by traditional cooking fuels.
- 4.Tree plantation drives across cities and villages are also helping improve air quality.

These examples show that both large – scale policies and small community actions can make a difference.

Future Careers and Opportunities

The fight for clean air is creating new career opportunities. Students interested in science and the environment can become environmental engineers, air quality analysts, climate scientists, or renewable energy experts. Emerging fields like green technology, sustainable urban planning, and environmental data science are growing rapidly.

Students can also become innovators by developing low - cost solutions for air purification and pollution monitoring.

DIY Activities for Students

Students can explore clean air concepts through simple activities.

A basic air purifier can be made using a fan and a filter. Students can observe how dust accumulates on the filter over time.

Planting indoor plants like money plants or snake plants can help improve air quality.



Building a simple air quality sensor using basic electronics can help students understand pollution levels. These activities encourage hands - on learning and innovation.

Classroom Activities for Teachers

Teachers can organize discussions on local air pollution issues and encourage students to propose solutions. Projects can include measuring air quality, creating awareness campaigns, or designing eco - friendly models. Field visits to parks, industries, or pollution monitoring stations can provide practical exposure. Teachers can also integrate topics like climate change and sustainability into science lessons.

Fun Fact

Did you know that indoor air can sometimes be more polluted than outdoor air?

Conclusion

Breathing Towards a Better Tomorrow.

Clean air is a basic necessity, not a luxury. Innovations for clean air show us that science and creativity can work together to solve one of the most pressing challenges of our time.

For students, this is an opportunity to learn, innovate, and take action. By understanding the science of air pollution and exploring solutions, they can contribute to a healthier and more sustainable future. The journey to clean air begins with awareness, continues with innovation, and succeeds through collective effort.

Riddles 2607

1. I turn yesterday's waste into today's flame in a village kitchen - what am I?
2. I drink sunlight and give water without wires - what am I?
3. I turn farm waste into energy - what am I?
4. I bring doctors through screens - what am I?
5. I connect villages without cables - what am I?

(Answers on Back Cover Inside)

Indian Scientist

R. Chidambaram

Padma Shri, Padma Vibhushan



(Nov 12, 1936 – Jan 4, 2025)

R. Chidambaram is one of India's most distinguished **nuclear scientists and physicists**. He played a major role in strengthening India's nuclear science, atomic energy program, and strategic research capabilities. He is widely recognised for his contributions to nuclear physics, materials science, and India's nuclear weapons program.

He was born in Chennai (then Madras), Tamil Nadu, India. His work greatly contributed to India becoming a leading nation in nuclear technology and scientific research. Chidambaram joined the Bhabha Atomic Research Centre (BARC) in 1962 and later became its Director from 1990 to 1993. He is best known for his leadership role in India's nuclear weapons program and for contributing to the successful Pokhran - II nuclear tests in 1998. His work in nuclear physics, reactor technology, and materials science played a key role in strengthening India's scientific and defence capabilities.

Major Scientific Contributions

- Led the **Pokhran - II Nuclear Tests (1998)**, establishing India as a declared nuclear power and strengthening national security.
- Advanced **nuclear reactor technology, atomic energy, and indigenous defence technologies**, promoting India's self - reliance in nuclear science.
- Made significant contributions to **condensed matter physics, crystallography, high - pressure physics, and materials science**, supporting advances in nuclear reactors, defence, and scientific instrumentation.

Awards and Recognition

- **Padma Shri** - awarded for his contributions to science and engineering.
- **Padma Vibhushan** - one of India's highest civilian honours.
- Distinguished Scientist honours from several Indian scientific organisations.
- Fellow of major scientific academies in India and abroad.
- Widely recognised for his contributions to India's nuclear science and strategic programs.

Legacy

R. Chidambaram strengthened India's nuclear capabilities through the **Pokhran - II nuclear tests** and advanced atomic energy research. His leadership, scientific excellence, and commitment to innovation inspired generations of scientists and contributed significantly to India's technological and national development.

Pen Holding Tool for Handless Person

The student from Kupwara district has developed an innovative idea involving a plastic stand with a thickness of 4 – 5 cm. The stand features a vertical hole designed to hold a pen or pencil securely. Two additional holes are made on the sides of the stand, allowing cloth or rubber straps to be attached for fastening the stand to the user's arm. The pen or pencil, fixed in the vertical hole, enables writing on paper, slate, or similar surfaces.



Adil Rashid Bara
10th Class



This tool allows individuals without hands to write easily, helping students or persons with disabilities participate in writing and painting competitions alongside their peers. It brings joy to disabled children by enabling them to feel more included and on par with other students. Over time, this tool can help improve their writing skills, allowing them to express their thoughts in writing and contribute meaningfully to society.

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

G Bags for Smart Preservation

The student observed that fruits, vegetables, and other items stored in plastic or regular bags spoil quickly without refrigeration. To solve this problem, the student developed G Bags, which are more effective than conventional storage bags. The key innovation is the use of garlic as a natural preservative. Garlic contains allicin, which protects fruits and vegetables from germs, viruses, and fungi. It also absorbs oxygen radicals, helping keep produce fresh for 10 – 15 days and preventing spoilage.



K. Pranaya
8th Class



G Bags are made by applying garlic paste to the inner surface of a cotton or jute bag and drying it in the sun for a few hours. A comparative experiment showed that vegetables stored in G Bags remained fresher for a longer time than those stored in conventional bags.

G Bags are an eco – friendly alternative to plastic bags, can reduce dependence on refrigeration, and have the potential to generate employment by involving women's groups in stitching and producing the bags, making the innovation both environmentally and socially beneficial.

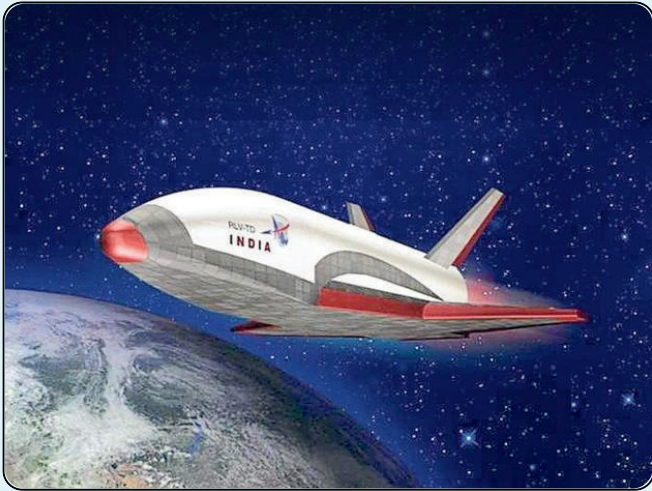
(Source: INSPIRE MANAK NLEPC 2022 Booklet)



Indian Inventions

Reusable Launch Vehicle RLV LEX

Imagine if every airplane were used only once. After carrying passengers from one city to another, the airplane would be discarded. Air travel would become extremely expensive and inaccessible to most people. Surprisingly, this is how traditional rockets have operated for decades. Most launch vehicles used for sending satellites into space are discarded after a single mission.



India's **Reusable Launch Vehicle – Landing Experiment (RLV – LEX)** is an important step toward making this vision a reality. Developed by the Indian Space Research Organisation, RLV – LEX demonstrates India's capability to develop reusable space transportation systems that can significantly reduce the cost of access to space.

What is RLV – LEX?

The **Reusable Launch Vehicle – Landing Experiment (RLV – LEX)** is a technology demonstration mission conducted by ISRO to test the autonomous landing capabilities of a reusable spacecraft. The vehicle resembles a small space shuttle or aircraft. Unlike conventional rockets that fall into the ocean or burn up after launch, a reusable launch vehicle is designed to return safely and be used again.

The RLV – LEX mission successfully demonstrated that a winged vehicle could autonomously approach a runway and land with high precision, similar to an aircraft.

This achievement is important because reusable launch systems can dramatically reduce the cost of launching satellites, scientific missions, and future space transportation systems.

Why Was RLV – LEX Needed?

Space exploration is expensive. Every rocket launch requires:

- Advanced materials
- Powerful engines
- Precision electronics
- Extensive testing
- Large support infrastructure

When a launch vehicle is used only once, much of this investment is lost after the mission. The global space industry has recognized that reusable systems can:

- Reduce launch costs
- Increase launch frequency
- Improve sustainability
- Make space more accessible

India's growing space ambitions require affordable and efficient launch systems. RLV – LEX was developed to test critical technologies needed for future reusable launch vehicles.

The Innovation Behind RLV – LEX

The most important innovation demonstrated by RLV – LEX is autonomous runway landing. Imagine dropping a paper airplane from a building and expecting it to land exactly on a small target hundreds of meters away.

Now imagine doing the same with a spacecraft traveling at high speed while dealing with wind, gravity, and atmospheric conditions. The engineering challenge is enormous. RLV – LEX shows that India possesses the technological capability to solve such complex problems.

Impact Created by RLV – LEX

The successful RLV – LEX mission demonstrated India's growing expertise in advanced aerospace technologies.

It strengthened capabilities in:

- Autonomous systems
- Guidance and control
- Aerodynamics
- Precision landing
- Space transportation

The mission also inspired students and researchers by showcasing India's commitment to innovation and self – reliance.



Future Outlook

The success of RLV – LEX is only the beginning. Future developments may include:

- Orbital reusable launch vehicles
- Two – stage reusable rockets
- Cargo transportation systems
- Human space transportation
- Space tourism applications

As technology advances, reusable systems may become the standard method of accessing space.

DIY Activity: Design a Reusable Spacecraft

Students can build a simple glider using cardboard or foam sheets.

Experiment with:

- Wing shapes
- Tail designs
- Weight distribution

Test which design glides the farthest and lands most smoothly. Discuss how engineers might optimize a reusable launch vehicle.

Conclusion

The Reusable Launch Vehicle – Landing Experiment represents one of India's most exciting technological achievements in recent years. It demonstrates how innovation, engineering, and scientific thinking can solve complex challenges.

Sudoku Challenge 2607

			8			9		
	9			7				4
	8	4					6	
			4	1		2		
		3				5		
		1		6	9			
	2					7	4	
9				2			3	
		7			6			

Indian Institute of Integrative Medicine (IIIM), Jammu

The **Indian Institute of Integrative Medicine (IIIM), Jammu**, is a premier research institute under the **Council of Scientific and Industrial Research (CSIR)**. Established in **1941** as the Drug Research Laboratory and renamed **IIIM in 2007**, it has over **80 years** of excellence in **drug discovery, medicinal plant research, and integrative medicine**. IIIM combines **traditional Indian medicine** with **modern biotechnology, pharmacology, and medicinal chemistry** to develop safe, effective, and affordable healthcare solutions.

Objectives

- Discover new drugs from **plants and microorganisms**.
- Integrate **Ayurveda, Unani, and Siddha** with modern science.
- Develop affordable medicines and biotechnology - based healthcare solutions.
- Promote medicinal plant cultivation, innovation, and entrepreneurship.

Significance

- Develops **herbal medicines** and treatments for diseases such as **cancer, diabetes, and inflammatory disorders**.
- Validates traditional medicine using modern scientific methods.
- Uses **biotechnology, molecular biology, and AI** to accelerate drug discovery.
- Supports **Make in India**, affordable healthcare, and rural livelihoods through medicinal plant cultivation.

Collaborations

Collaborates with CSIR laboratories, universities, pharmaceutical industries, international research organisations, and startups through its Technology Business Incubator (TBI).

Achievements

- Developed **Picroliv**, a liver - protective drug.
- Discovered valuable bioactive compounds from **Himalayan medicinal plants**.
- Supported **125+ startups** and contributed to the **CSIR Aroma Mission (Lavender Revolution)**.
- Holds numerous patents in **drug formulations, natural products, and biotechnology**.

Future Vision

IIIM is advancing **AI - driven drug discovery**, biotechnology, precision medicine, phytopharmaceuticals, startup incubation, and global collaborations to strengthen India's leadership in biomedical research and sustainable healthcare.



Easy Waste Separating Chopping Board

The student observed that modern chopping boards make it difficult to separate wet kitchen waste. Managing vegetable waste such as ladyfinger stems, chilli peduncles, and other scraps can be inconvenient. To address this problem, the student developed an innovative solution.

The setup involves installing a chopping board above the kitchen cupboard. Two holes are cut into the edges of the board, positioned directly over separate compartments inside the cupboard. As vegetables are chopped, waste and usable portions can be easily separated and collected into different buckets placed beneath the holes.



The system is designed with minimal gaps between the existing countertop and the new setup, ensuring it remains close to the cooking area for maximum convenience. This project simplifies kitchen work by allowing users to chop and manage waste simultaneously, making the cooking process more efficient and hygienic.

(Source: INSPIRE MANAK NLEPC 2022 Booklet)



Edla Nani
7th Class

Integrated Pothole Sealer

A student observed that pothole - related road accidents are increasing daily. To address this issue, he developed the Integrated Pothole Sealer (IPS), a powerful, cost - effective, and innovative solution for repairing potholes.

The IPS combines all the necessary components for sealing potholes into a single machine, significantly saving time and improving efficiency. It is also eco - friendly, as all components can be powered by electricity. With a manufacturing cost of just Rs. 25,000 and a lifespan of 3 - 5 years, the IPS has the potential to save up to Rs. 40,000 per working day with further adaptation.



Designed to be simple to operate, the machine allows unskilled labourers to seal potholes, creating job opportunities and enabling ordinary citizens to contribute when necessary. While the machine primarily uses low - viscosity filling materials, a rotating drum mechanism enables the use of high - viscosity liquids and solids as well. Among the filling options, liquid asphalt patch is the preferred material.

(Source: INSPIRE MANAK NLEPC 2022 Booklet)



Shrish Madhan
9th Class

Solution
Word Search 2607



Solution
Sudoku Challenge 2607

6	1	2	8	3	4	9	5	7
3	9	5	6	7	2	8	1	4
7	8	4	1	9	5	3	6	2
8	5	9	4	1	3	2	7	6
4	6	3	2	8	7	5	9	1
2	7	1	5	6	9	4	8	3
1	2	6	3	5	8	7	4	9
9	4	8	7	2	1	6	3	5
5	3	7	9	4	6	1	2	8

Riddle 2607 Answer

1. Biogas system 2. Solar Pump 3. Biomass 4. Telemedicine 5. Wireless Net



GYS GURU PURASKAR

Towards Building a Nation of Innovation



GYS
Avishkar
AWARDS

A National Innovation Projects Competition Online

Young Scientist Club
HOME FOR INNOVATION POWERED BY GETA SERVICE TRUST

GYS *Avishkar* AWARDS 2026

A National Innovation Projects Competition

Theme: Low Cost Grassroots Innovation

Mode: Online Video Submission (3 to 7 mins)

Eligibility: Students from Classes 6 to 12

Winners: Certificates, Trophies, Cash Prizes

Attention: Guide Teachers are Rewarded

**Rs. 1,30,000
One Lakh Thirty
Thousand Rupees
Cash Prizes**



₹ 20,000

for Student

₹10,000

for Guide Teacher



₹ 15,000

for Student

₹10,000

for Guide Teacher



₹ 10,000

for Student

₹10,000

for Guide Teacher

**+ 10
Consolation Prizes**



GYS GURU PURASKAR 2026

A National Video Submission Contest Online for Working Teachers

Cash Prizes Rs 50,000

Theme

My Recommendations for a Curriculum
to Imbibe Innovation Culture Among
School Students



Visit today...

YoungScientistIndia.org

Ph. 9966775534, 9966332456