February 2026

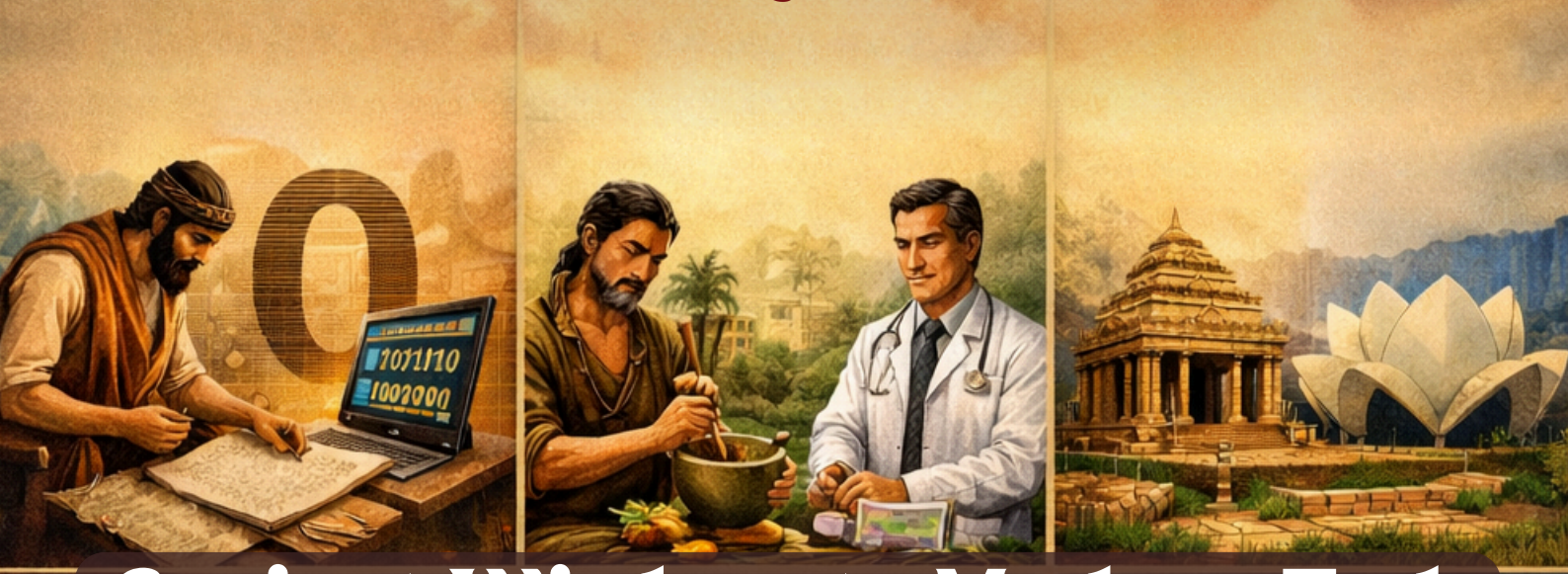
The Concept of Democracy
The Panchatantra

Cyber Science
Hack Your World

Expert Jigsaw
Multi-voting

Young Scientist India

A Science & Innovation Magazine for Curious Teachers



Ancient Wisdom to Modern Tech

How Traditional Knowledge Inspires Today's Innovations

M. S. SWAMINATHAN | G. N. RAMACHANDRAN

SUBRAHMANYAN CHANDRASEKHAR | VENKATRAMAN RAMAKRISHNAN

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From the Editor's Desk

Welcome, Young Scientists!

Greetings to our bright, curious, and ever-questioning readers. As we move forward in this exciting new year of Young Scientist India, we are delighted to bring you another engaging edition, one that blends timeless wisdom with modern scientific thinking.

Our Cover Story, **Ancient Wisdom to Modern Tech**, invites you to explore how ideas from the past continue to shape the technologies of today. It reminds us that innovation is not always about something entirely new, it is often about reimagining and refining knowledge that has stood the test of time.

This month's Innovation Training Modules introduce **Expert Jigsaw** and **Multi-voting,** collaborative tools that show how collective thinking can lead to better solutions. Innovation thrives not just in individual brilliance, but in the ability to listen, share, and build ideas together.

Curiosity takes centre stage through articles that uncover the science behind our everyday lives. From **Cyber Science**, which explores the invisible digital world around us, to **The Psychology of the Supermarket**, where you discover how design influences decisions, this issue encourages you to observe more closely. Adding to this is **Hack Your World: Solving Problems the Jugaad Way**, a powerful reminder that creativity and resourcefulness can turn even the simplest ideas into impactful solutions.

We also celebrate India's remarkable intellectual and scientific legacy. From the strategic thinking behind **Snakes and Ladders**, to the enduring principles of **Democracy and Governance**, and the timeless lessons of **The Panchatantra**, these innovations show how ideas can shape societies for generations. This spirit of excellence continues through the inspiring journeys of Indian scientists like M. S. Swaminathan, Subrahmanyan Chandrasekhar, G. N. Ramachandran, and Venkatraman Ramakrishnan, whose work has shaped global scientific progress.

Equally inspiring are the innovations emerging from young minds across the country. From ideas like **Dadi Nani 2.0** and **Beej Rakshak Yantra** to solutions such as **VisionAir** and eco-friendly technologies, students are addressing real-world challenges in sustainability, health, and accessibility. Complementing this are cutting-edge developments featured in our knowledge base, along with insights from leading research institutions where science continues to push boundaries and create impact.

Together, these stories remind us that innovation is everywhere—in our traditions, in our surroundings, and within each of us.

I hope this edition inspires you to think creatively, act thoughtfully, and innovate with purpose.

Vennela Valiveti, B. Des.
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S&I Article

Cyber Science

Today's world is deeply connected through the internet. From sending emails and attending online classes to using digital payments and social media, technology plays a major role in our daily lives. But have you ever wondered how all this information travels safely across the internet? The field that studies and protects the digital world is known as **Cyber Science.**

Cyber science is the study of **computer systems, digital networks, and online security.**

It helps scientists and engineers understand how digital technologies work and how to protect them from cyber threats such as hacking, data theft, and viruses. As our world becomes more digital, cyber science is becoming one of the most important areas of science and technology.

What is Cyber Science?

Cyber science combines knowledge from several fields such as **computer science, mathematics, engineering, and data science**.

Experts in cyber science study how information moves through computer networks and how these systems can be protected.

Every time you send a message, make an online payment, or log into a website, cybersecurity is working behind the scenes to ensure that your information is safe.

Cyber scientists design systems that:

- Protect personal data
- Prevent cyber attacks
- Secure digital communication
- Detect suspicious online activity

Without these protections, the internet would not be safe to use.

Why is Cyber Security Important?

Cybersecurity is a major part of cyber science. It focuses on protecting computers, networks, and digital information from unauthorised access.

Imagine if someone could easily access bank accounts, school databases, or government systems. This could cause serious problems. Cybersecurity systems prevent such attacks by using **encryption, passwords, firewalls, and monitoring systems.** Even small actions, such as creating strong passwords and avoiding suspicious links, help improve cyber safety.

Did You Know?

Some cyber attacks are carried out by **ethical hackers** experts who legally break into systems to find weaknesses and improve security.

Careers in Cyber Science

Cyber science is one of the fastest-growing career fields in the world.

As technology expands, organisations need skilled professionals to protect their digital systems.

Some careers in cyber science include:

- **Cyber Security Analyst** – Protects networks and systems from cyber threats
- **Ethical Hacker** – Tests systems to identify vulnerabilities
- **Digital Forensics Expert** – Investigates cyber crimes
- **Network Security Engineer** – Designs secure communication systems
- **Data Security Specialist** – Protects sensitive data

Many industries such as **banks, hospitals, government agencies, and technology companies** rely on cyber science experts.

How Students Can Start Learning Cyber Science

Students interested in cyber science can begin by developing basic **computer and logical-thinking skills.**

Some useful skills include:

- Learning basic programming languages such as Python or Java
- Understanding how computer networks work
- Practising problem – solving and logical reasoning
- Learning about online safety and digital responsibility

Many schools now introduce **coding and digital literacy programs** to prepare students for future careers in technology.

Classroom Activity

Teachers can help students understand cyber science through a simple activity.

Password Strength Challenge

Ask students to create two passwords:

- One simple password
- One strong password using letters, numbers, and symbols

Discuss which password is harder to guess and why. This activity helps students understand the importance of strong digital security practices.

The Future of Cyber Science

The importance of cyber science will continue to grow as new technologies develop. Innovations such as **artificial intelligence, smart devices, cloud computing, and digital banking** all depend on secure digital systems.

Cyber scientists are working on new ways to protect data, detect cyber threats faster, and create safer online environments.

In the future, cyber science may also play a key role in protecting **smart cities, autonomous vehicles, and space communication systems.**

Conclusion

Cyber science is the science that protects the digital world we rely on every day. From securing personal data to defending global networks, it plays a crucial role in modern society.

For students, cyber science offers exciting opportunities to explore technology, solve complex problems, and contribute to a safer digital future.

The next generation of cyber scientists may come from today's classrooms students who are curious about technology and ready to protect the digital world.

Dadi Nani 2.0

Nitye Bansal
8th Class

For generations, Indian folk tales, customs, and moral lessons were passed down through grandparents' storytelling. However, with changing lifestyles and increased screen time, many children today are growing disconnected from these rich cultural traditions. In several communities, over half of traditional knowledge is fading, and more than 220 languages are considered endangered. Conventional textbooks and modern games often fail to make cultural learning engaging or relatable, leading to a growing gap between generations and a gradual loss of heritage.

Dadi Nani 2.0 reimagines storytelling through an interactive, voice-enabled puzzle game. Designed as a "virtual grandmother," the AI-powered voice companion narrates folk tales, explains festivals and customs, and shares moral lessons in an engaging manner. Players solve puzzles to unlock new stories and can even choose alternate endings, making the experience immersive and participatory. Accessible through smart speakers or mobile devices, the game blends tradition with technology. By gamifying cultural education, Dadi Nani 2.0 creates a meaningful bridge between generations while preserving India's storytelling legacy in a format that resonates with modern children.

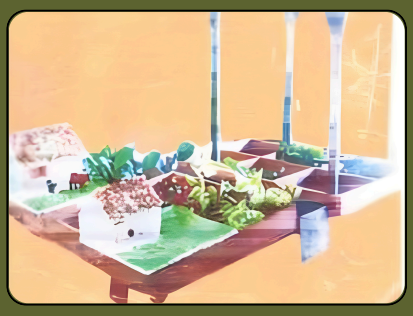
(Source: GYS Avishkar Awards 2025 Booklet)

Link for the project's video presentation
YouTube.com/@GETAYoungScientist

Hi-Tech Agriculture

Manju Verma
8th Class

With increasing water scarcity and rising input costs, farmers face the challenge of producing more with fewer resources. Traditional farming often relies heavily on water and focuses on a single crop, making farmers vulnerable to droughts and market fluctuations. This project emphasizes water conservation and integrated farming as a solution for sustainable agriculture. The Hi-Tech Agriculture model divides one acre of land into five integrated sections animal husbandry, horticulture, poultry, fishery, and crop cultivation. By combining these activities, farmers can generate diversified income while reducing risk.



The system also promotes efficient resource use by recycling materials, such as using animal waste as manure and fishery water for irrigation. Built as a demonstration using wood, tin, and thermocol, the model illustrates how scientific planning and integrated farming can improve farmers' income while conserving natural resources.

(Source: INSPIRE MANAK NLEPC 2012 Booklet)

Cover Story

Ancient Wisdom to Modern Technology

When we think of technology, we often imagine computers, satellites, artificial intelligence, or smartphones. However, many ideas behind modern technologies actually have roots in **ancient knowledge and traditional practices** developed thousands of years ago.

Across civilizations, people carefully observed nature, experimented with materials, and developed solutions to everyday problems. These early discoveries in **mathematics, medicine, architecture, agriculture, and engineering** laid the foundation for many modern scientific ideas.

India, in particular, has a long tradition of combining **observation, logic, and creativity** to solve problems.

Today, scientists and engineers are rediscovering many of these ideas and adapting them for modern challenges such as sustainable development, medicine, and climate change.

Let us explore how ancient wisdom continues to inspire modern technology.

Mathematics: From Zero to Modern Computing

One of the most influential contributions of ancient Indian knowledge is the concept of **zero**. Indian mathematicians such as **Aryabhata** and **Brahmagupta** helped develop the decimal number system, which later spread around the world.

Without the number system and zero, modern technologies such as **computers, digital communication, and artificial intelligence** would not exist. Binary code, which is used in computers, relies heavily on the idea of place value numbers.

Mathematics developed centuries ago now powers space missions, data science, and financial systems around the world.

Classroom Activity

Ask students to try solving multiplication problems using **Roman numerals** and then using the **Indian decimal system**. Which one is easier and why?

Medicine: Ancient Healing and Modern Healthcare

Traditional medical knowledge has also influenced modern healthcare systems. **Ayurveda**, which developed more than 3,000 years ago, focuses on maintaining balance in the body through diet, herbs, lifestyle, and preventive care.

Ancient medical texts written by scholars such as **Sushruta** described surgical techniques, instruments, and treatments. In fact, Sushruta is often called the **"Father of Surgery."**

Many modern pharmaceutical researchers study traditional medicinal plants mentioned in Ayurvedic texts to develop new drugs.

Today, scientists combine **modern medical research with traditional knowledge** to explore natural medicines and holistic healthcare approaches.

Did You Know?

Ancient Indian surgeons performed **plastic surgery and cataract operations** over 2,000 years ago.

Classroom Activity

Ask students to list **five medicinal plants** commonly found at home or in the community (such as turmeric, ginger, or tulsi). Discuss how traditional remedies use these plants.

Architecture and Engineering: Learning from Nature

Ancient architects developed innovative techniques to deal with heat, water management, and urban planning.

One remarkable example is the **stepwell**, an ancient water storage system built in many parts of India. Stepwells collected rainwater and allowed communities to access water even during dry seasons.

Similarly, ancient cities like **Mohenjo-daro** and **Harappa** had well-planned streets, drainage systems, and houses with ventilation.

Today, architects study these traditional designs to develop **climate - responsive buildings,** which stay cool naturally and reduce energy use.

Did You Know?

Some stepwells are more than **seven stories deep** and were designed with advanced knowledge of groundwater and engineering.

Classroom Activity

Ask students to design a **model house that stays cool without using electricity.** What features would they include?

Metallurgy and Materials: Ancient Innovations in Metal

Ancient India also made significant contributions to **metallurgy**, the science of metals.

A famous example is the **Iron Pillar of Delhi,** which has stood for more than 1,600 years without rusting significantly. Scientists believe that the unique composition of iron and environmental conditions helped prevent corrosion.

Ancient craftsmen also produced **high - quality steel known as Wootz steel,** which was famous around the world and used to make strong and sharp swords.

Modern materials scientists study these ancient techniques to understand **corrosion resistance, metal durability, and sustainable manufacturing.**

Did You Know?

Wootz steel, produced in India, was exported to the Middle East, where it was used to create the famous **Damascus swords.**

Agriculture: Traditional Knowledge for Sustainable Farming

Farmers have long relied on traditional knowledge to grow crops sustainably. Practices such as **crop rotation, mixed cropping, and natural pest control** were used centuries before modern agricultural science.

Many traditional farming systems focus on **working with nature rather than against it**. Today, scientists studying sustainable agriculture are rediscovering these practices to reduce chemical use and protect soil health.

For example, natural fertilisers such as **compost and organic manure** improve soil fertility while protecting the environment.

Modern agricultural scientists now combine traditional knowledge with **satellite technology, weather forecasting, and data analysis** to help farmers increase productivity sustainably.

Classroom Activity

Ask students to interview a **local farmer or elder in the community** about traditional farming practices. What methods are still used today?

From Ancient Ideas to Future Innovations

Ancient wisdom teaches us that innovation does not always begin in laboratories or high-tech industries. Many great ideas come from **careful observation of nature, experimentation, and learning from experience.**

Today's scientists and engineers are combining **traditional knowledge with modern technology** to solve global challenges such as climate change, food security, and sustainable development.

For example:

- Traditional water harvesting techniques are being used in modern **rainwater harvesting systems.**
- Herbal knowledge is helping researchers discover **new medicines.**
- Ancient architectural ideas are inspiring **energy - efficient buildings.**

Think Like an Innovator

Innovation often happens when we connect **old knowledge with new ideas**. Students and teachers can explore this by asking simple questions:

- What traditional practices exist in our community?
- Can they be improved using modern technology?
- How can we learn from nature to solve problems?

Innovation Challenge for Students

Choose one traditional practice (such as water storage, food preservation, or natural medicine).

Then design a **modern technological solution inspired by it.**

Present your idea as:

- a drawing
- a model
- a short presentation

Conclusion

The journey from **ancient wisdom to modern technology** shows that knowledge is a continuous process. Every generation builds upon the discoveries of the past.

By studying traditional ideas and combining them with modern science, today's students can become the innovators of tomorrow. The wisdom of the past may very well inspire the future of technology.

After all, the greatest innovations often come from **looking back, learning deeply, and imagining boldly.**

Indian Scientist

M. S. Swaminathan

Padma Vibhushan

(7 Aug 1925 – 28 Sept 2023)

Imagine a country where farmers work hard but still cannot grow enough food for everyone. In the 1960s, India faced this serious challenge. Food production was low, and the country depended on imports from other nations to feed its population. At this crucial time, one scientist played a major role in changing India's agricultural future – **M. S. Swaminathan.**

Dr. Swaminathan was born in 1925 in Kumbakonam, Tamil Nadu. As a young student, he witnessed the devastating **Bengal Famine of 1943**, during which millions of people died due to hunger.

Dr. Swaminathan was born in 1925 in Kumbakonam, Tamil Nadu. As a young student, he witnessed the devastating Bengal Famine of 1943, during which millions of people died due to hunger. This event deeply affected him and made him realise that increasing food production was one of the most important challenges for the country. Instead of becoming a doctor like his father, he chose to study **agricultural science and plant genetics** so he could help farmers grow more food.

In the 1960s, Swaminathan worked with farmers, researchers, and international scientists, including the renowned agronomist Norman Borlaug. Together, they introduced **high-yielding varieties of wheat and rice**, along with better irrigation, fertilisers, and improved farming techniques. These new methods helped farmers produce much larger harvests from the same land.

The impact was remarkable. Wheat production increased dramatically, especially in states like Punjab and Haryana. This transformation became known as the **Green Revolution**, and it helped India move from food shortages to becoming largely self-sufficient in food production.

Dr Swaminathan also believed that agriculture must protect nature while supporting farmers' livelihoods. To continue this mission, he founded the M. S. Swaminathan Research Foundation in Chennai. The foundation works on sustainable farming, biodiversity conservation, and improving rural livelihoods.

Dr. Swaminathan's work shows how science can solve real-world problems. His dedication helped feed millions of people and reminds students that innovation and compassion can truly change the world.

Science & Innovation Lab

CSIR Madras Complex (CSIR - CMC), Chennai

The **CSIR Madras Complex (CSIR-CMC)** in Taramani, Chennai, is one of the **Council of Scientific and Industrial Research (CSIR)** 's important research campuses - India's largest network of scientific laboratories. Established in 1987, the complex was designed to strengthen research activities in southern India and provide advanced facilities for scientists working in different fields of science and technology.

Unlike many standalone laboratories, CSIR - CMC functions as a **shared innovation campus**. It supports multiple research groups and institutions that work together on scientific challenges. Researchers here study areas such as **materials science, environmental science, engineering technologies, chemical sciences, and sustainable development**. By sharing laboratories, equipment, and expertise, scientists from different backgrounds can collaborate and develop practical solutions to real-world problems.

One of the most interesting aspects of CSIR - CMC is its focus on **converting research ideas into usable technologies.** Scientists here work to improve industrial processes, develop eco-friendly materials, and explore technologies that support sustainable growth. Such work demonstrates how scientific research can move from a laboratory experiment to a solution that benefits society.

For teachers and students, CSIR-CMC represents an important idea: **innovation often happens through collaboration**. Many breakthroughs occur when experts from different disciplines work together and combine their knowledge.

Classroom Idea for Teachers

Teachers can conduct a simple **"Collaborative Innovation Challenge."** Divide students into small groups and give them a real-life problem, such as reducing plastic waste in school, saving water on campus, or improving classroom energy efficiency. Ask each group to think like scientists from different fields. One student may act as an environmental scientist, another as an engineer, and another as a designer. Together, they must propose a practical solution.

This activity helps students understand how research institutions like CSIR-CMC work by bringing different ideas and expertise together to create innovative solutions.

Institutes such as CSIR - CMC remind students that science is not only about studying concepts but also about **working together to solve challenges and build technologies that shape the future.**

S&I Article

The Psychology of the Supermarket

Have you ever gone to a supermarket to buy only milk and bread but returned home with chips, chocolates, biscuits, and maybe even a soft drink? This happens to many shoppers across India. Whether it is in stores like Reliance Smart, Big Bazaar, or DMart, the layout of the store is carefully designed to influence what customers buy.

Retail designers and marketers study **consumer psychology** how people think and behave while shopping. They then arrange products, shelves, and displays in ways that encourage customers to buy more items.

Let's look at some of the clever strategies used in supermarkets across India.

Why Are Essentials Always at the Back?

In many Indian supermarkets, everyday items like **milk, rice, atta, and cooking oil** are often placed at the back of the store.

This design forces shoppers to walk through several aisles before reaching what they came for. Along the way, they pass shelves filled with snacks, biscuits, instant noodles, and beverages.

For example, while walking to pick up atta, a shopper might notice offers on chips or buy a packet of **Maggi noodles** or biscuits like **Good Day or Marie.**

This increases the chances of **impulse buying,** purchasing something that was not planned.

Eye-Level is Buy - Level

Have you noticed how some brands seem easier to see on shelves?

Products placed at eye level are more likely to be noticed and purchased.

That is why popular brands often occupy these shelves.

For instance:

- Premium cereal boxes may be placed at eye level.
- Cheaper alternatives might be on the bottom shelf.

In snack aisles, brands like **Lay's chips or Oreo biscuits** are often positioned where shoppers can easily spot them.

Similarly, colorful cereal boxes and chocolates are placed at **children's eye level,** making them attractive to younger shoppers.

The Power of Smell and Display

Supermarkets often use sensory tricks to make products more appealing.

In many Indian stores, the **fresh bakery section** releases the smell of baked bread, cakes, or puffs. This smell can make shoppers hungry and encourage them to buy snacks.

Fruit and vegetable sections are usually placed near the entrance with bright lighting. Seeing fresh apples, bananas, and tomatoes creates the feeling of entering a healthy and fresh store.

This positive feeling can influence customers to continue shopping inside.

Checkout Counter Temptations

Have you noticed what is placed near the billing counters?

Small items such as:

- chocolates
- chewing gum
- mints
- small toys
- batteries

They are often displayed near the checkout.

When customers are waiting in line to pay, they may quickly add one or two of these items to their basket.

This strategy works especially well with children who may ask parents to buy a chocolate while waiting.

Why Are Shopping Carts So Big?

Another clever trick involves the **size of shopping carts and baskets.**

Large carts make it look like you have bought very little, even after adding several items. This can subconsciously encourage shoppers to keep filling the cart.

In some stores, baskets are placed right at the entrance so that customers who plan to buy just one or two things may end up picking several more.

Did You Know?

Many supermarkets play **slow background music** to make customers walk more slowly through the aisles. The longer people stay in the store, the more likely they are to buy additional items.

Classroom Activity

Students can try a fun observation activity.
Next time you visit a supermarket with your family, observe the store and answer these questions:

- Where are essential items like rice, milk, or cooking oil located?
- Which products are placed at eye level?
- What items are displayed near the billing counter?
- Which products have special offer boards or discount signs?

Discuss with your classmates how these strategies influence what people buy.

Conclusion

Supermarkets may look like simple places to buy groceries, but they are actually designed using **psychology, marketing, and behavioural science.** From shelf placement to lighting and product displays, many elements are carefully planned to influence shopping decisions.

Understanding these strategies helps students become **smarter and more aware consumers.** The next time you walk into a supermarket, look around carefully – you might start noticing the science behind your shopping choices.

Beej Rakshak Yantra

Aayush Jain
11th Class

For rural farmers, preserving seeds is as important as growing crops. However, high humidity, fluctuating temperatures, and poor storage conditions often lead to seed spoilage, fungal growth, and reduced germination rates. When stored seeds lose quality, farmers are forced to purchase new ones, resulting in financial strain and the gradual loss of indigenous seed varieties. In many villages, the lack of affordable and reliable storage solutions continues to threaten agricultural sustainability and food security. Beej Rakshak Yantra offers a low-cost, technology-driven solution to this challenge.

The device uses a DHT11 sensor connected to an Arduino UNO to continuously monitor humidity levels inside seed storage units. When moisture exceeds safe limits, the system automatically activates a fan to reduce humidity and protect the seeds. LED indicators provide visual alerts about unsafe conditions, enabling farmers to respond promptly. Powered by solar energy, the device operates off-grid, making it ideal for rural areas with limited electricity access. Compact, efficient, and farmer-friendly, Beej Rakshak Yantra helps preserve seed quality, improve germination rates, and reduce crop loss sustainably.

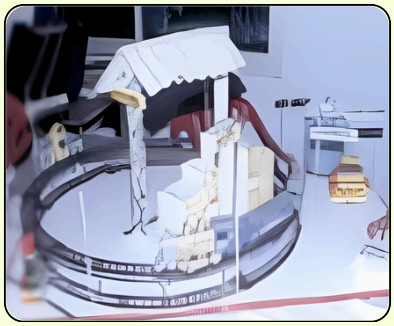
(Source: GYS Avishkar Awards 2025 Booklet)

Link for the project's video presentation
YouTube.com/@GETAYoungScientist

Eco-Friendly Tracks Sanitation System

Anita Mahara
8th Class

Since the introduction of railways in India in 1853, trains have connected millions of people, but open discharge from train toilets has created serious sanitation problems at railway stations, causing foul odours, unhygienic conditions, and environmental pollution. Due to heavy usage and limited sanitation staff, maintaining cleanliness becomes difficult and chemicals used for cleaning may also affect soil and water. This project proposes an eco-friendly solution by collecting human waste and converting it into biogas through a biogas plant.



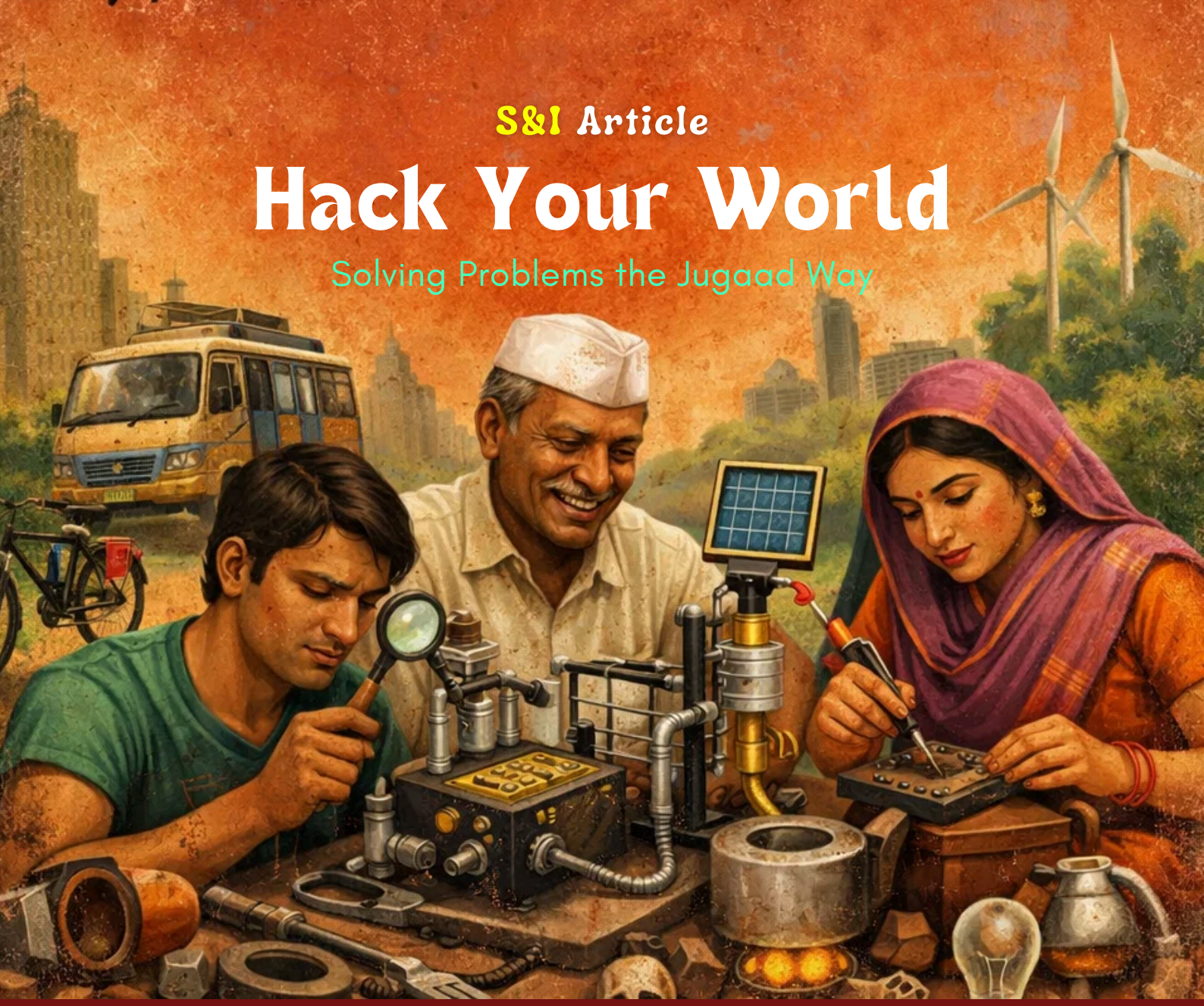
The methane-rich gas produced can run a generator to produce electricity for railway station facilities. By converting waste into energy, the system improves sanitation, protects the environment, and helps create cleaner, greener, and more sustainable railway stations.

(Source: INSPIRE MANAK NLEPC 2011 Booklet)

S&I Article

Hack Your World

Solving Problems the Jugaad Way



In India, people often say, **"Kuch na kuch jugaad ho hi jayega!"** This popular phrase reflects a powerful idea - **finding a clever solution using whatever resources are available.**

The word **"Jugaad"** is commonly used across India to describe **creative, low-cost problem - solving.** Instead of waiting for expensive equipment or perfect tools, people think differently and make things work using simple materials.

From villages and farms to city workshops and school classrooms, jugaad thinking has helped people solve everyday problems in smart and innovative ways.

What is Jugaad Innovation?

Jugaad innovation is about **creativity, flexibility, and practicality.** It usually follows three simple principles:

- **Use available materials**
- **Keep solutions simple and affordable**
- **Solve the problem quickly**

For example, in many rural parts of India, farmers have created small vehicles using **motorcycle engines attached to carts** to transport crops.

These vehicles may look unusual, but they help farmers move goods efficiently at a low cost.

Similarly, roadside mechanics often repair machines using creative methods when proper spare parts are not available.

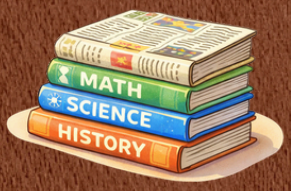
This spirit of practical problem-solving is the heart of **jugaad innovation.**

Every day, Jugaad Students Can Recognize

Students may have already seen examples of jugaad in daily life without realising it.

Some familiar examples include:

- Using a **plastic bottle as a drip irrigation system** to water plants slowly.
- Turning **old newspapers into book covers** to protect textbooks.
- Using **cardboard boxes to build school science models.**
- Fixing a broken slipper temporarily using a safety pin or a rubber band.



These solutions may be simple, but they show how people use creativity to solve problems quickly.

Famous Indian Examples of Jugaad

India has produced many well - known innovations inspired by the spirit of jugaad.

One example is the **Mitticool refrigerator**, invented by Mansukhbhai Prajapati.

These solutions may be simple, but they show how people use creativity to solve problems quickly.

Famous Indian Examples of Jugaad

India has produced many well - known innovations inspired by the spirit of jugaad.

One example is the **Mitticool refrigerator**, invented by Mansukhbhai Prajapati.

This refrigerator is made from clay and works **without electricity,** helping families in rural areas store food.

Another famous example is the **Jaipur Foot,** a low - cost artificial limb that allows people with disabilities to walk again. It is affordable and used by thousands of people around the world.

In agriculture, farmers sometimes design their own tools using bicycle wheels, pipes, and small motors to make farming easier.

These examples show how **simple ideas can create a powerful impact.**

Why Jugaad Matters for Innovation

Jugaad teaches an important lesson: **limitations can inspire creativity.**

When people do not have access to expensive tools or advanced technology, they are often forced to think differently and experiment with simple solutions.

Many companies and researchers are now studying this idea, often calling it **frugal innovation** developing affordable and efficient solutions for real-world problems.

Jugaad thinking is especially important in areas such as:

- rural development
- sustainability
- affordable technology
- environmental solutions

Think Like a Jugaad Innovator

Students can practice jugaad thinking by observing problems around them.

Ask questions such as:

- Can this object be reused instead of thrown away?
- Is there a simpler way to solve this problem?
- Can I build something useful using waste materials?

For example, students have created:

- phone stands using cardboard
- windmills using plastic bottles
- small bridges using ice-cream sticks
- water filters using sand, gravel, and charcoal

These small experiments help develop **problem - solving and innovation skills**.

Classroom Activity: The Jugaad Challenge

Teachers can organise a fun **Jugaad Innovation Challenge** in the classroom.

Divide students into small groups and give them a problem, such as:

- Carrying water without spilling it
- Designing a bridge using only paper and tape
- Creating a plant watering system from a plastic bottle
- Building a simple toy using waste materials

Students must solve the problem using only basic materials like paper, cardboard, rubber bands, straws, or plastic bottles.

Afterwards, each group can explain how their solution works.

Conclusion

Jugaad shows that innovation is not limited to laboratories or expensive technology. It often begins with **curiosity, creativity, and observation.**

By learning to think like jugaad innovators, students can develop the ability to solve problems in smart and practical ways.

The next time you face a challenge, remember that sometimes the best solution is not the most expensive one. It is the **most creative one.**

Indian Scientist

Subrahmanyan Chandrasekhar

Padma Vibhushan

(19 Oct 1910 – 21 Aug 1995)

Have you ever looked up at the night sky and wondered what happens to stars when they grow old? One of the scientists who helped answer this question was **Subrahmanyan Chandrasekhar**, one of the greatest astrophysicists of the 20th century.

Chandrasekhar was born in 1910 in Lahore (now in Pakistan), which was then part of British India. From a young age, he showed great curiosity about science and mathematics. Interestingly, he was the nephew of the famous Indian physicist C. V. Raman, who inspired him to pursue scientific research.

At the age of just 19, Chandrasekhar made a remarkable discovery while travelling by ship from India to England for his studies. During the journey, he began calculating what happens to stars after they use up their fuel. His calculations showed that stars above a certain mass cannot remain stable and eventually collapse under their own gravity. This important idea later became known as the **Chandrasekhar Limit.**

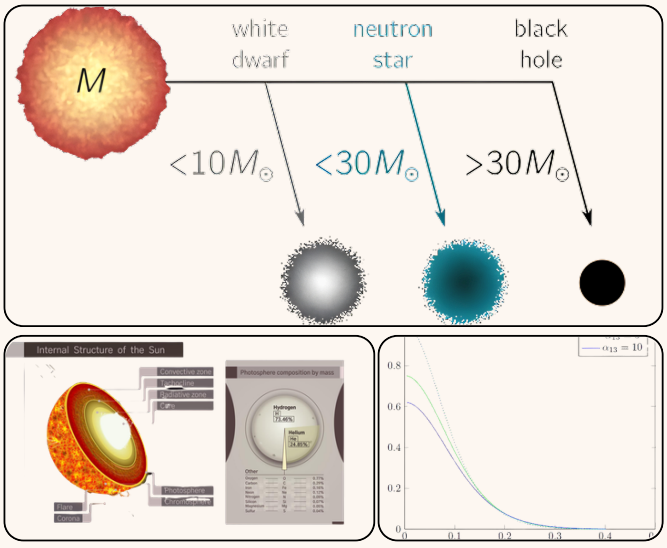
The Chandrasekhar Limit explains that when a dying star is more than about **1.4 times the mass of our Sun**, it cannot remain a stable white dwarf star. Instead, it may collapse further to form extremely dense objects such as **neutron stars or black holes.**

Today, this discovery is one of the most important concepts in modern astrophysics.

At first, many scientists did not accept his theory. However, years later, his work was proven correct and became a foundation for understanding stellar evolution. In recognition of his groundbreaking research, Chandrasekhar was awarded the Nobel Prize in Physics in 1983.

Chandrasekhar spent most of his career at the **University of Chicago**, where he conducted research and mentored generations of scientists. His work helped scientists better understand how stars are born, evolve, and eventually die.

The story of Subrahmanyan Chandrasekhar reminds us that curiosity and persistence are essential for scientific discovery. A young student travelling across the ocean made calculations that changed our understanding of the universe. His work continues to inspire students who dream of exploring the mysteries of space.



Innovation Training Module

Expert Jigsaw

Building the Future Peice by Peice

Hello, Teachers and Future Innovators!

Is your classroom feeling a bit tired from the heavy daily curriculum? Sometimes, the best way to recharge is to change how we learn. Imagine an activity that feels like a break a lively, social game, but actually helps students master a difficult topic faster than any lecture could.

This is the **Expert Jigsaw.**

In the world of high - level science, nobody works alone. NASA didn't land a rover on Mars because one person knew everything; they did it because thousands of specialists shared their own "puzzle pieces" to create a mission that worked. The Jigsaw technique brings that same NASA - style teamwork into your classroom.

Let's progress through the four stages of this module to see how it turns your students into a team of **Innovation Architects.**

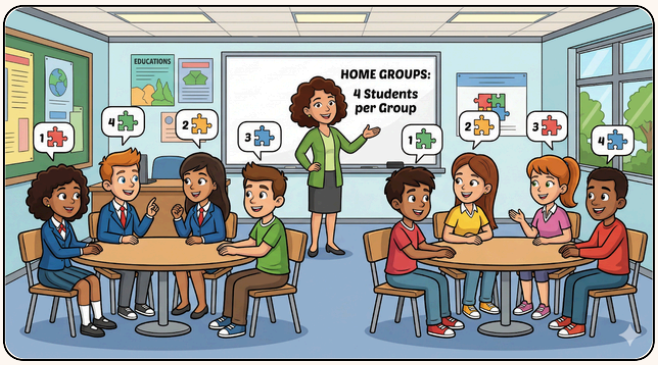
Stage 1: The "Identity" Phase (Forming the Home Groups)

Every great mission starts with a team. In the Jigsaw world, we begin at **Home Base.**

The Setup: The teacher divides a big, important topic - like The Future of Energy into four different "clues":

1. **Solar Power** (The Physics)
2. W**ind Energy** (The Engineering)
3. N**uclear Power** (The Safety & Science)
4. E**conomics** (The Cost & Implementation)

Divide your class into groups of four. In each group, assign one student to be "Expert 1," another to be "Expert 2," and so on. At this stage, they are a team, but they realise they are all missing three - quarters of the information!



Why this helps the student: It creates Positive Interdependence. Students quickly realise that if they don't do their part, their friends won't be able to finish the "puzzle." This builds a sense of responsibility and team spirit.

Stage 2: The "Expertise" Phase (The Specialist Meeting)

Now, the room moves! All the "Number 1s" from every group leave their home base and meet in a separate corner. All the "Number 2s" do the same. This is the **Expert Group.**

The Mission:

These students now have one job: **to become the smartest people in the room on their specific sub - topic.** They read a short article, look at a diagram, or discuss a few key facts together. They brainstorm the best way to explain their "piece" to their friends back at home base.

How it Grooms an Innovation Mindset

- **Deep Diving:** Students learn that to teach something, you have to truly understand it.
- **Peer Support:** If one student is confused, their fellow "experts" help them out. This is how scientists collaborate in real labs.
- **Confidence:** Even a student who is usually shy feels empowered because they are now the only ones with specific, "secret" knowledge.

Stage 3: The "Transmission" Phase (The Return of the Experts)

The specialists now fly back to their original **Home Groups**. The atmosphere changes from quiet study to an active "Knowledge Exchange."

The Action

One by one, the experts take the floor. Student 1 teaches the group about Solar. Then Student 2 explains Wind. No teacher is standing at the whiteboard; instead, mini - teaching sessions are happening at every single desk.

Why this is a game-changer

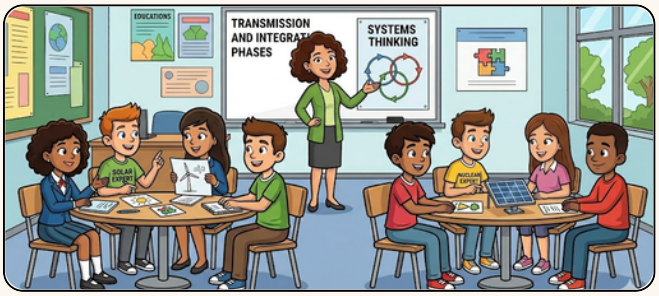
- **Communication Skills:** Students learn to simplify hard ideas so their friends can understand them.
- **Active Listening:** The other students take notes because they know they will be tested on the whole topic, not just their own part.
- **Breaking Hierarchies:** It proves that every student has a brain capable of mastering and sharing complex information.

Stage 4: The "Integration" Phase (Completing the Puzzle)

Finally, it's time to see the "Big Picture." The teacher brings the class together for a **Synthesis Challenge.**

The Challenge:

Now that your group has all four pieces (Solar, Wind, Nuclear, and Economics), design a power plan for a new city. You must use the data from all four experts to make it work.



The Innovation Outcome:

This stage mimics **Systems Thinking**. Students learn that in science, nothing exists alone. A change in the "Economics" piece affects the "Solar" piece. They stop looking for "the right answer" and start looking for the "best solution", which is exactly what innovators do.

Why the Jigsaw is Recommended

Using this technique as a "curriculum break" actually makes the curriculum stick better. It transforms the classroom into a laboratory of human connection.

1. **Critical Thinking:** They don't just memorise; they connect the dots.
2. **Empathy:** They learn to value what their classmates say.
3. **Leadership:** Every student gets a turn to be the leader of their topic.
4. **Efficiency:** You can cover a massive chapter in 45 minutes because the work is shared!

Teacher's Quick-Start Checklist:

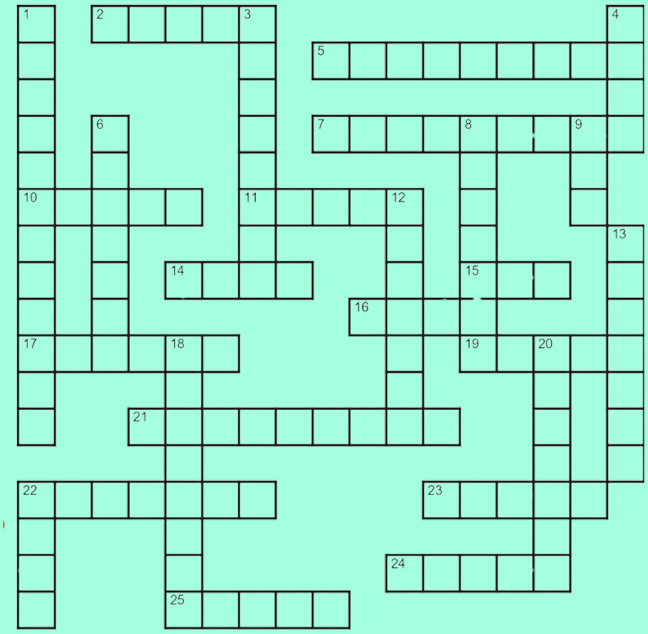
- **Mix it up:** Put different personalities together in Home Groups.
- **The "Check - In":** Roam between Expert Groups to make sure their "facts" are accurate before they go back to teach.
- **The Reward:** Give a "Team Bonus" if every member of a Home Group passes a quick quiz at the end.

Conclusion: Building the Future, Piece by Piece

The **Expert Jigsaw** proves that while individual brilliance is great, **collective genius** - like the teams at NASA is what truly changes the world.

Give your students their piece of the puzzle today, and watch them build a masterpiece tomorrow.

Word Search 2602 - Wild Animals



Across

02. Feared ocean predator.
05. Large reptile with scales.
07. Similar to a crocodile.
10. Black and white bear.
11. Has a horn on its nose.
14. King of the jungle.
15. Clever and sly mammal.
16. Howls at the moon
17. Swings from tree to tree.
19. Soars high in the sky.
21. Has stinging tentacles.
22. Known for their intelligence.
23. Sleeps in eucalyptus trees.
24. Black and white striped.
25. Orange and black striped.

(Answers on Back Cover Inside)

Down

1. Large water-dwelling mammal.
3. Hops on its hind legs.
4. Big and furry land mammal.
6. Waddles on ice.
8. Long-necked animal.
9. Wise bird.
12. Has eight tentacles.
13. Fastest land animal.
18. Largest land mammal.
20. Close relative to humans.
22. Antlered animal.

Alligator	Panda
Kangaroo	Elephant
Bear	Penguin
Koala	Fox
Cheetah	Rhino
Lion	Giraffe
Crocodile	Shark
Monkey	Gorilla
Deer	Tiger
Octopus	Hippopotamus
Dolphin	Wolf
Owl	Jellyfish
Eagle	Zebra

Atal Swachham

Tushar Nimab Suryavanshi
12th Class

In many rural households and communities, sanitation workers and homemakers rely on multiple tools for daily cleaning — separate brooms, scrubbers, and buckets of water. Carrying three to five plastic tools along with heavy water containers often leads to fatigue, back strain, and wasted time. Low-quality equipment breaks easily and requires excess water, making cleaning both physically demanding and inefficient. In small homes with limited storage space, managing multiple tools adds further inconvenience. There is a clear need for a simple, durable, and eco-friendly alternative that reduces effort while improving efficiency.

Atal Swachham addresses this challenge with an all-in-one, modular cleaning tool that combines sweeping, scrubbing, and controlled water dispensing into a single lightweight broom. Made using bamboo and recycled plastic, the design is environmentally friendly and cost-effective. The integrated

system reduces cleaning effort by nearly 50%, minimizes water usage, and eliminates the need for multiple tools. Easy to handle and store, Atal Swachham empowers sanitation workers and rural households with a practical, dignified, and sustainable grassroots innovation that makes daily cleaning smarter and more efficient.

(Source: GYS Avishkar Awards 2025 Booklet)

Link for the project's video presentation
YouTube.com/@GETAYoungScientist

Allure of Avatar

Rakesh
9th Class

Bioluminescence, from the Greek bios (life) and Latin lumen (light) is nature's way of producing light through a chemical reaction inside living organisms. Fireflies and marine bacteria such as Vibrio fischeri glow because of a reaction in which a pigment called luciferin is oxidised by the enzyme luciferase, releasing visible light. However, this natural glow is usually too faint for practical use. Scientists discovered that by modifying genetic material and creating reusable genetic components called "bio-bricks," the light-producing genes could be inserted into other organisms. When introduced into E. coli bacteria, even a small culture produced enough light to read by.

Building on this idea, the project explores how engineered bio-bricks can help organisms continuously recycle light-producing compounds, sustaining the glow. Controlled by genetic systems like the lux operon, this process can function efficiently within cells. One exciting future possibility is the development of glowing plants or trees that act as natural streetlights. Such bio-engineered illumination could reduce electricity consumption and offer an eco-friendly alternative for urban lighting, blending biotechnology with sustainable innovation.

(Source: INSPIRE MANAK NLEPC 2013 Booklet)

CSMCRI – Central Salt and Marine Chemicals Research Institute

Have you ever wondered how the salt on your dining table is produced, or how seawater can be turned into drinking water? Scientists at the **CSIR - Central Salt and Marine Chemicals Research Institute (CSMCRI)** work on exactly these fascinating questions. Located in **Bhavnagar, Gujarat**, this institute is part of the **Council of Scientific and Industrial Research (CSIR)** and was established in **1954** to study salt, marine chemicals, and coastal resources.

India has one of the longest coastlines in the world, and seawater contains many valuable minerals. Scientists at CSMCRI research better ways to **produce high-quality salt,** improve salt harvesting methods, and extract important minerals such as magnesium and bromine from seawater. These chemicals are used in medicines, fertilisers, and several industrial products.

Another exciting area of work at CSMCRI is **desalination**, a technology that removes salt from seawater to make it safe for drinking. This research is extremely useful for **coastal areas and water-scarce regions**, where freshwater is limited. The institute has developed innovative desalination systems that can help communities access clean water.

CSMCRI scientists also study **marine algae and seaweed**, which may become an important resource for the future. Seaweed can be used to produce **food additives, medicines, biodegradable materials, and even biofuels.** Their research also supports coastal livelihoods by promoting seaweed farming.

Activity Idea for Teachers

Teachers can connect this research to the classroom through a simple experiment. Ask students to **collect a small sample of saltwater**, pour it into a shallow dish, and leave it in the sunlight. Over time, students will observe **salt crystals forming as the water evaporates.**

Teachers can then discuss questions such as:

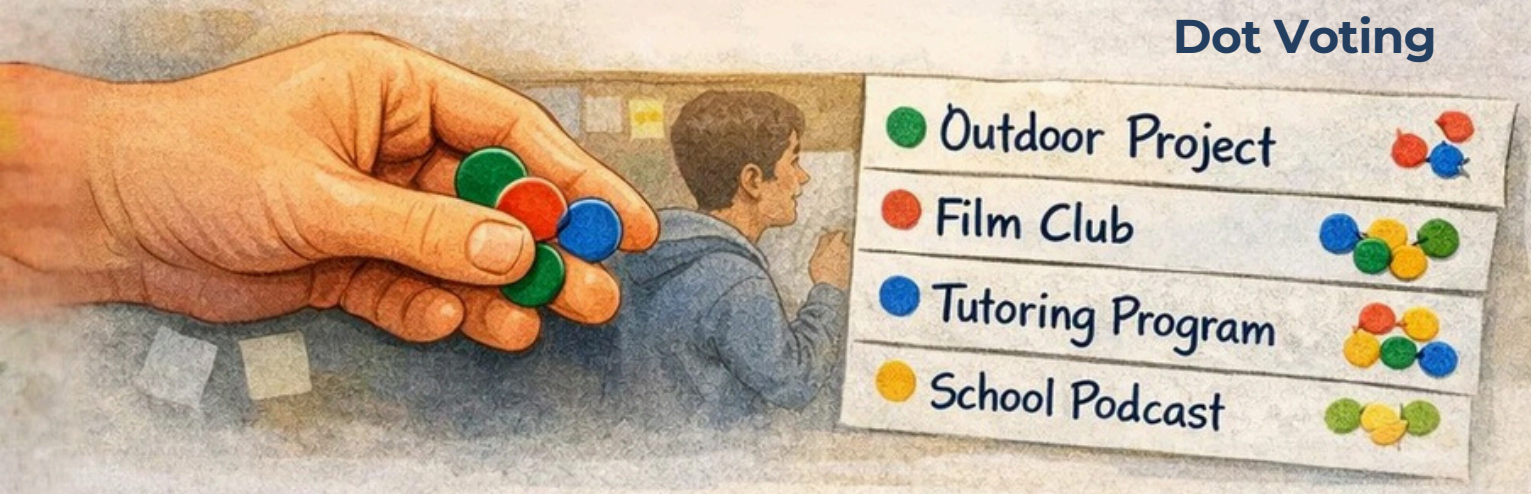
- Why do crystals form when water evaporates?
- How might large salt farms use this same principle?
- What other minerals could be present in seawater?

This simple activity helps students understand **evaporation, crystallisation, and real-world applications of chemistry**, showing how everyday science connects to large research institutions like CSMCRI.

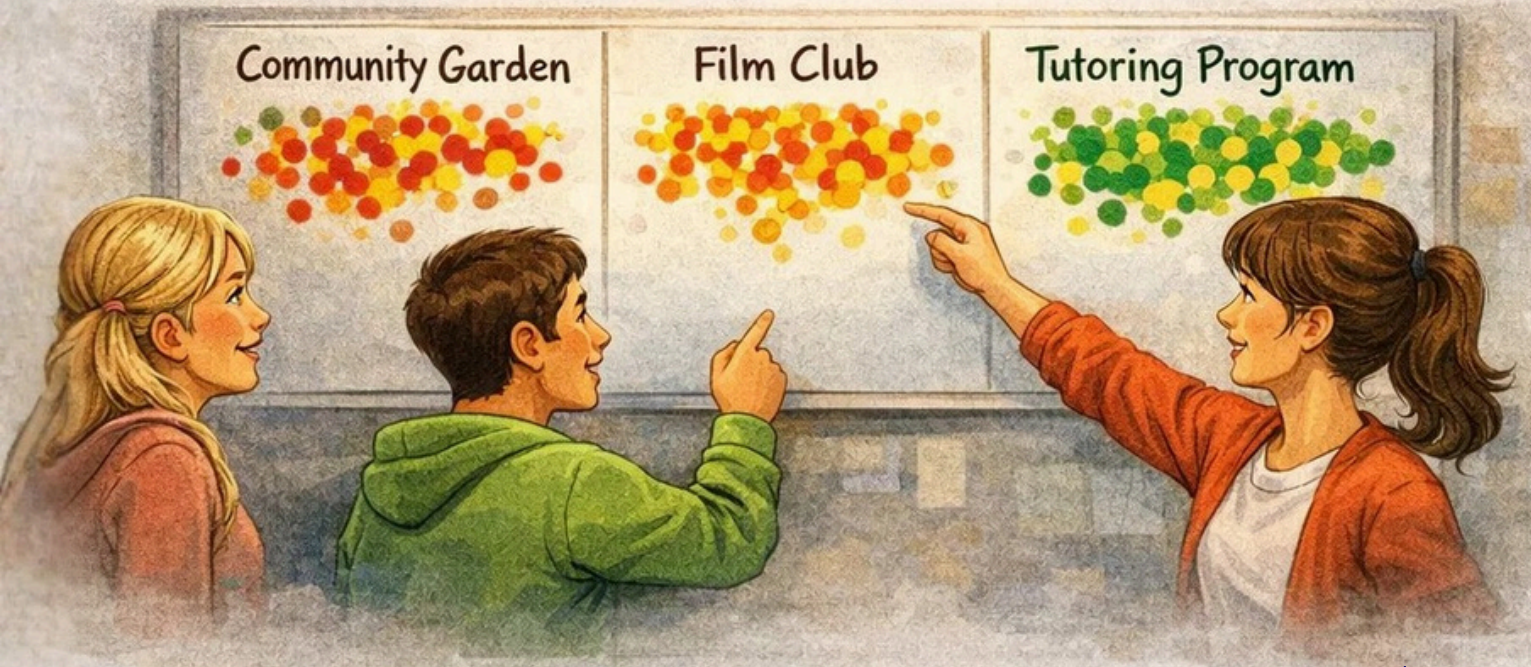
Innovation Training Module

The Power of Multi-voting

Dot Voting



Heat Map Results



Have you ever asked a classroom of thirty students, "What should we do for our next science project?" and been met with thirty different, passionate answers? Or worse, has a single "loud" voice decided the fate of the whole group while everyone else sat in silence?

In the world of professional innovation at places like Google, SpaceX, or even local startup teams, don't just "pick an idea." They use a secret weapon called **Multi-voting.**

Multi-voting (sometimes called **Dotmocracy**) is a brilliant way to take a giant mountain of brainstormed ideas and narrow them down to the very best ones. It's fair, it's fast, and it's a total game - changer for classroom harmony.

Let's walk through the three stages of this decision - making "Power - Up."

Stage 1: The "Idea Blizzard" (Brainstorming)

Before you can vote, you need choices! Start by letting your students go wild with ideas. Use sticky notes or a big whiteboard.

The Rule: There are no "bad" ideas in Stage 1. If a student suggests "Building a Rocket to Mars out of Cardboard," put it on the board!

Once the board is full, the teacher helps the class **Group & Clean.** If five students suggested "Solar Power," group them into one category. This ensures the vote isn't split between similar topics.

Why this helps the student: It teaches Categorization. Students learn to see patterns in data and organise messy information into neat, logical groups.

Stage 2: The "Dot" Currency (The N/3 Rule)

Here is where the magic happens. Instead of giving every student just one vote, you give them a "budget" of votes.

The Math: A good rule of thumb is the **N/3 Rule.** If you have 15 ideas on the board, give every student 5 votes (15 divided by 3). These votes can be represented by sticky dots, checkmarks with a marker, or even digital "likes."

The Action: Students walk up to the board and place their "currency" next to the ideas they think are the strongest.

- They can put all 5 dots on one "super-idea."
- Or, they can spread them out across 5 different ideas.

How it grooms an Innovation Mindset:

- **Prioritisation:** Students learn that resources (like votes) are limited. They have to think: "Is this idea worth two of my dots, or just one?"
- **Democratic Fairness:** The "loudest" student only has 5 dots, just like the quietest student. Everyone has an equal impact on the final result.

Stage 3: The "Heat Map" (The Final Reveal)

Once the voting is done, step back and look at the board. You will see a "Heat Map" of the class's brain. Some ideas will be covered in dots, while others will have none.

The Result: You don't just have a "winner"; you have a **Consensus**. Even if a student's favourite idea didn't win, they can usually see that their second favourite choice is moving forward. This creates "buy - in" and reduces grumbling.

The Innovation Outcome: This stage teaches **Analytical Thinking**. Instead of an emotional argument about which idea is "coolest," the class makes a data - driven decision based on what the group actually values.

Why Modern Classrooms Need Multi-voting

Multi-voting turns a potentially messy argument into a structured, fun exercise in leadership.

1. **Eliminates Groupthink:** Students aren't just following the leader; they are spending their own "dots" on what they truly believe in.
2. **Visual Impact:** It's hard to argue with a board full of dots. It provides instant, visual proof of what the team wants.
3. **Speed:** You can narrow down 50 ideas to 3 in less than ten minutes.

Teacher's Pro-Tip:

To make it even more "scientific," give the students **the criteria** before they vote. Tell them: "*Use your dots for the ideas that are the most FEASIBLE to finish by Friday.*" This forces them to think like project managers!

Conclusion: Deciding Together, Moving Faster

The **Multi-voting** technique proves that the best way to move forward is to listen to every voice in the room. By giving your students the power of "the dot," you are teaching them the most important skill of all: how to reach a fair agreement and get to work.

Indian Scientist

G. N. Ramachandran

Padma Bhushan

(8 Oct 1922 – 7 Apr 2001)

Inside every living cell are tiny molecules called **proteins** that perform essential functions, such as building tissues, transporting oxygen, and fighting disease. But have you ever wondered how scientists discovered the complex shapes of these microscopic molecules? One of the scientists who made a groundbreaking contribution to this field was **G. N. Ramachandran.**

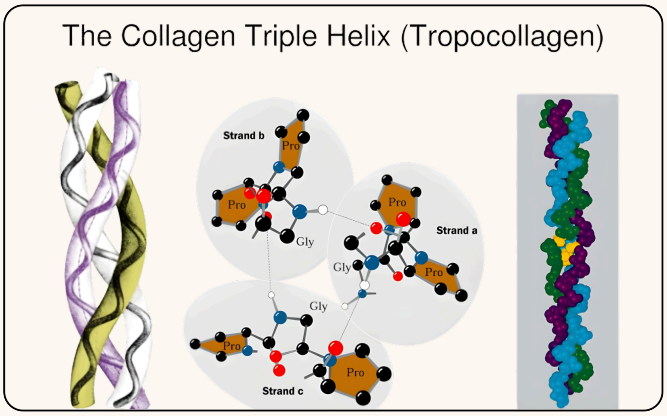
Gopalasamudram Narayana Ramachandran, often called **G. N. Ramachandran**, was born in 1922 in Tamil Nadu, India. From an early age, he showed great interest in physics and mathematics. After completing his studies, he began researching how the structure of molecules affects their function in living organisms.

Ramachandran made his most famous contribution while studying **proteins and their three-dimensional structures**. Proteins are made of long chains of amino acids that fold into specific shapes. Understanding these shapes is important because a protein's function depends on how it folds.

In the 1960s, Ramachandran and his team developed an important scientific tool known as the **Ramachandran Plot.**

This plot helps scientists understand the possible angles and shapes that protein chains can take while folding. By mapping these angles, researchers can determine whether a protein structure is realistic.

Today, the Ramachandran Plot is widely used in **structural biology, bioinformatics, and molecular biology**. Scientists around the world rely on it when studying proteins, designing medicines, and understanding diseases. It remains one of the most important tools in protein research.



Ramachandran also played a key role in developing scientific research in India. He established important research programs and helped train many young scientists who later made significant contributions in science and medicine.

His work shows that major discoveries can come from careful thinking and strong curiosity about nature's smallest structures. By helping scientists understand how proteins fold and function, **G. N. Ramachandran's work continues to influence modern biology, medicine, and biotechnology.**

His story reminds students that even the tiniest molecules can hold big scientific mysteries waiting to be solved.

Snakes and Ladders

Board games have entertained people for centuries, but some games also carry deeper meanings and lessons. One such fascinating game is **Snakes and Ladders,** which many children in India and around the world enjoy playing today. While it may seem like a simple game of dice and chance, its origins reveal an interesting story about **Indian culture, philosophy, and education.**

The modern version of Snakes and Ladders actually comes from an ancient Indian game known as **Moksha Patam or Paramapada Sopanam,** which was played as early as the 13th century.

The Origins of the Game

Snakes and Ladders was originally designed not just for entertainment but also to **teach moral values.** The game was believed to have been created by Indian saints and teachers to help children understand the difference between **good deeds and bad deeds.**

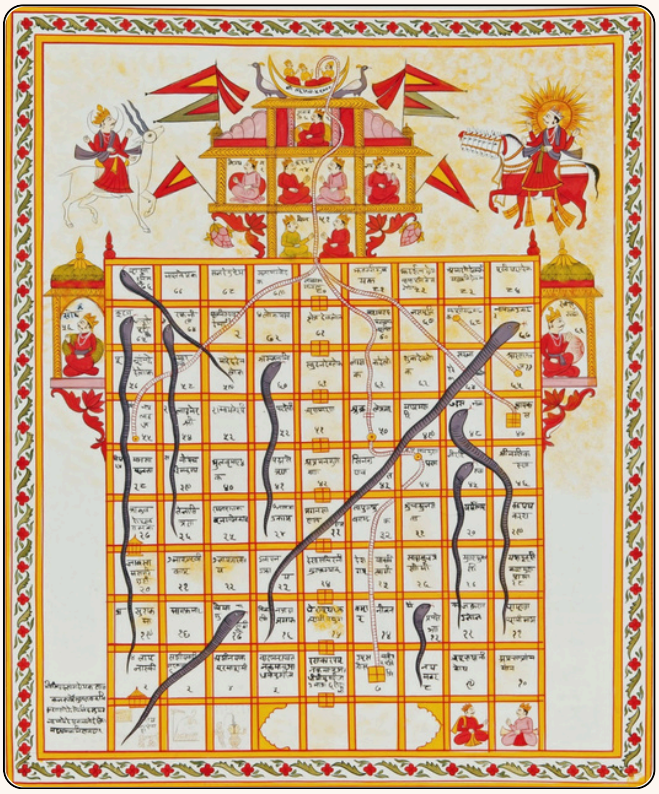
In the original game board, ladders represented **virtues** such as kindness, generosity, humility, and honesty. Climbing a ladder symbolised progress in life.

On the other hand, snakes represented **vices** such as greed, anger, jealousy, and dishonesty. When a player landed on a snake's head, they had to slide down, symbolising how bad actions can cause setbacks.

The goal of the game was to reach the final square, which symbolised **Moksha**, or spiritual liberation.

Learning Through Play

Ancient educators in India believed that games could be powerful tools for learning. Snakes and Ladders was used to teach children important life lessons simply and engagingly.



For example:

- Helping others could move you forward in life, just like climbing a ladder.
- Negative actions could lead to problems, just like sliding down a snake.

Through this playful system, children could understand the **consequences of actions** and the importance of making good choices.

This concept of learning through games is now widely used in modern education.

How the Game Spread Around the World

During the colonial period, British soldiers and travellers in India discovered the game and brought it back to England in the late 19th century.

In England, the game was simplified and renamed **Snakes and Ladders.** The strong moral and spiritual elements were gradually removed, and the game became more focused on fun and chance.

Later, the game spread to many other countries. In the United States, a similar version was created called **Chutes and Ladders.**

Today, the game is played by millions of children worldwide and remains one of the most recognisable board games.

Why Snakes and Ladders is an Innovation

Snakes and Ladders is an example of an early **educational innovation.** Long before modern educational technology, Indian thinkers created a learning tool that combined **storytelling, ethics, and gameplay.**

This game demonstrates several important ideas:

- Learning can happen through play.
- Simple tools can teach complex concepts.
- Education can be both fun and meaningful.

Modern educators now use similar techniques in **gamification**, where games are used to improve learning and motivation.

Did You Know?

The earliest versions of Snakes and Ladders had **more than 100 squares,** and some boards included specific moral messages written next to snakes and ladders.

Classroom Activity

Teachers can help students explore the original meaning of Snakes and Ladders with a creative activity.

Ask students to design their **own version of the board game** by:

1. Drawing a board with snakes and ladders.
2. Assigning each ladder a positive value, such as honesty, teamwork, or kindness.
3. Assigning each snake a negative habit, such as laziness, anger, or cheating.

Students can then play the game and discuss how these actions affect progress.

This activity helps students understand both **game design and moral lessons.**

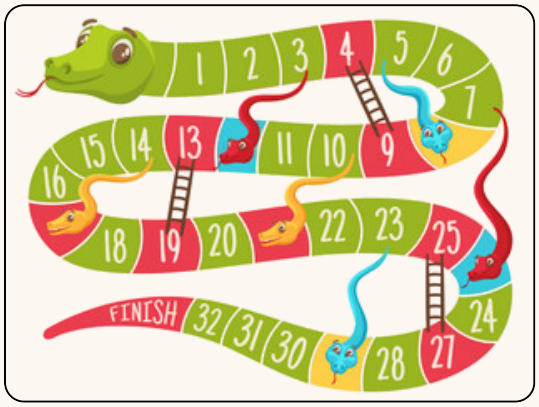
Conclusion

Snakes and Ladders is more than just a board game. It is a fascinating example of how ancient Indian thinkers used creativity to teach important lessons about life.

What began as a moral teaching tool in India eventually became a popular game enjoyed across the world.

Today, when students roll the dice and climb ladders or slide down snakes, they are unknowingly participating in a tradition that connects **play, learning, and cultural heritage.**

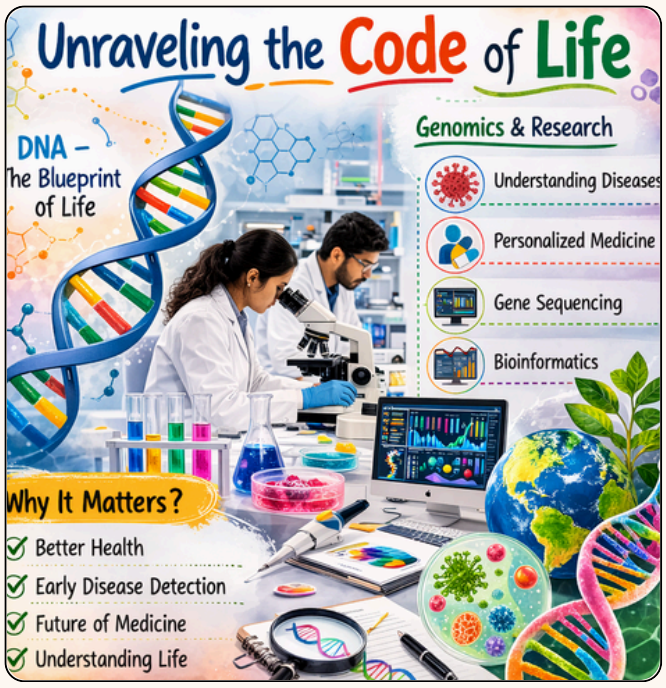
This simple yet powerful invention reminds us that sometimes the best ideas are those that make learning **fun, meaningful, and memorable.**



IGIB - Institute of Genomics and Integrative Biology

Have you ever wondered what makes every human being unique? Why do some people have certain traits, or why do some diseases affect people differently? Scientists at the **CSIR-Institute of Genomics and Integrative Biology (IGIB)** explore these questions by studying **genes and DNA**, the tiny instructions inside our cells that determine how our bodies grow and function.

Located in **New Delhi**, IGIB is a research institute under the **Council of Scientific and Industrial Research (CSIR).** The institute focuses on **genomics**, which is the study of the complete set of genes in living organisms. By understanding genomes, scientists can learn how diseases develop and how better treatments can be created.



Researchers at IGIB use advanced technologies such as **DNA sequencing, bioinformatics, and molecular biology** to study human health, microbes, and genetic disorders.

Their work has helped scientists understand diseases like **cancer, respiratory illnesses, and rare genetic conditions.**

During the COVID-19 pandemic, IGIB scientists also played an important role in **sequencing virus genomes,** which helped track how the virus was evolving.

Another fascinating area of research at IGIB is **personalized medicine.** Scientists are exploring how treatments can be designed based on an individual's genetic makeup. In the future, this could allow doctors to choose medicines that work best for each person.

Activity Idea for Teachers

Teachers can introduce the concept of genetics through a simple classroom activity.

Ask students to observe traits among classmates, such as **attached or detached earlobes, tongue rolling ability, or dimples**. Students can record how many classmates share each trait and discuss how these features are passed from parents to children.

This activity helps students understand **basic genetics and variation,** while also connecting classroom learning with real scientific research being carried out at institutes like IGIB.

It shows students that the study of DNA is not just a textbook topic it is shaping the **future of medicine and human health.**

Indian Inventions

The Concept of Democracy and Governance

When we think about democracy today, we often imagine elections, parliaments, and citizens voting to choose their leaders. India, the world's largest democracy, proudly follows this system. But many people may not realise that **ideas of democratic governance existed in India thousands of years ago.**

Ancient Indian societies developed systems of decision - making where groups of people discussed issues and made choices together. These early political systems show that the concept of **shared governance and public participation** has deep roots in Indian history.

Early Democratic Ideas in Ancient India

Around the 6th century BCE, several regions in India were governed by political systems known as **Gana-Sanghas.** These were republic - like states where leaders were chosen through discussions and assemblies rather than being ruled by a single king.

One of the most famous examples was the ancient republic of **Vaishali**. In Vaishali, rulers were elected or selected by a council of representatives who met to discuss important decisions related to governance, laws, and administration.

Members of these assemblies debated issues, expressed different opinions, and voted on decisions, an approach that resembles modern democratic practices.

These early republics demonstrate that ideas about **participation, representation, and debate** were already present in Indian society long before modern democratic systems developed elsewhere.

Assemblies and Public Participation

Ancient texts and historical records describe various councils and assemblies where decisions were made collectively.

In many regions, councils known as **sabhas** and **samitis** discussed matters related to governance, community welfare, and conflict resolution.

These assemblies allowed members of the community to express their views and participate in decision - making.

Leaders were expected to listen to different opinions before making important choices.

This tradition of public discussion helped create systems where governance was not only about authority but also about **responsibility and accountability.**

Panchayati Traditions in Indian Villages

Another important form of democratic governance in India developed through **village councils,** commonly known as **panchayats**.

For centuries, village elders gathered to discuss community matters such as water management, land use, resolving disputes, and organising festivals.

The word **"panchayat"** comes from the word panch, meaning five, referring to a council of respected community members.

These councils functioned as local decision - making bodies where people worked together to solve problems and maintain harmony in the village.

Even today, the system of local **self - governance** continues through institutions such as **Gram Panchayats,** which play an important role in rural development.

From Ancient Ideas to Modern Democracy

India's modern democratic system reflects many principles that existed in ancient traditions of governance.

Today, citizens elect representatives to the **Parliament of India,** where laws are debated, and decisions are made for the country.

The Indian Constitution ensures that every citizen has the right to vote and participate in shaping the nation's future.

India's democratic system includes:

- Elections at the national, state, and local levels
- Public debate and discussion
- Representation of diverse communities
- Laws that protect citizens' rights

These features highlight how democratic governance continues to evolve while maintaining its core principles.

Why Democracy Matters

Democracy allows citizens to have a voice in how their country is governed. It encourages discussion, respect for different opinions, and collective decision - making.

For students, democracy teaches important values such as:

- responsibility
- participation
- fairness
- respect for others' views

Understanding the history of democracy in India helps us appreciate how these ideas developed over time and why they remain important today.

Did You Know?

The ancient republic of Vaishali is sometimes considered **one of the earliest known republics in the world,** where leaders were chosen through assemblies rather than a hereditary monarchy.

Classroom Activity

Teachers can organise a **Mock Student Parliament** activity in the classroom.

Students can:

1. Form small groups representing different ideas or proposals.
2. Discuss a school issue, such as improving the library or organising a sports event.
3. Debate the ideas and vote on the best solution.

This activity helps students experience how democratic discussions and decision - making work.

Conclusion

The concept of democracy and governance is not just a modern invention; it has deep roots in Indian history.

From the ancient republics of early India to village panchayats and modern parliamentary systems, the idea of **people participating in decision-making** has been an important part of Indian society.

By understanding these traditions, students can see how innovation in governance has shaped the world we live in today.

Democracy reminds us that the strength of a nation lies in the voices of its people and their ability to work together to build a better future.

Riddles 2602

1. From palm - leaf writings to digital screens, I store knowledge. What am I?
2. Ancient carts used me, and modern robots still roll on me. What am I?
3. Ancient sailors followed me, and scientists study me with telescopes. What am I?
4. Once I burned in caves, now I launch rockets into space. What am I?
5. From smoke signals to smartphones, I carry messages across the world. What am I?

Sudoku Challenge 2602

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

(Answers on Back Cover Inside)

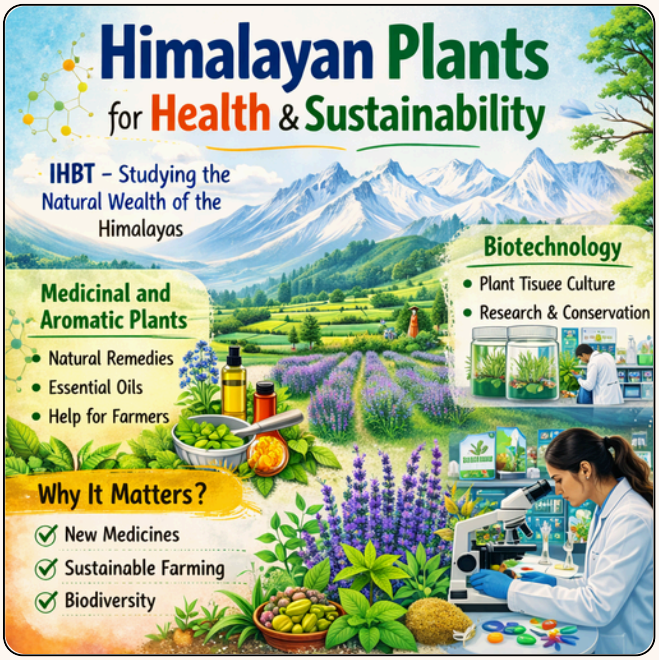
IHBT – Institute of Himalayan Bioresource Technology

The Himalayan region is one of the richest areas in the world for **plants, biodiversity, and natural resources.** Scientists at the **CSIR-Institute of Himalayan Bioresource Technology (IHBT)** study these unique resources and explore ways to use them sustainably for science, medicine, and rural livelihoods.

Located in **Palampur, Himachal Pradesh,** and functioning under the **Council of Scientific and Industrial Research (CSIR),** IHBT focuses on research related to **Himalayan plants, medicinal herbs, aromatic crops, and biotechnology.** The institute works to understand how plants from the Himalayan region can be used to develop medicines, essential oils, and other useful products.

One of the most interesting areas of research at IHBT is **medicinal and aromatic plants.** Many plants growing in the Himalayas contain natural compounds that can be used in pharmaceuticals and healthcare products. Scientists study these plants to understand their properties and help farmers cultivate them scientifically. For example, IHBT has helped promote the cultivation of **lavender and other aromatic crops,** which has provided new income opportunities for farmers in Himalayan villages.

IHBT also works in **plant biotechnology**, including techniques such as plant tissue culture. This technology allows scientists to grow plants in controlled laboratory conditions and produce large numbers of healthy plants quickly. These techniques are useful for conserving rare species and improving crop productivity.



Activity Idea for Teachers

Teachers can connect this research to classroom learning through a simple activity on **plant diversity and useful plants.** Ask students to collect information about **three plants commonly found in their surroundings** such as tulsi, mint, or neem—and note their uses in medicine, cooking, or daily life.

Students can present their findings and discuss:

- Why are plants important for human health?
- What makes medicinal plants valuable?
- How can we protect plant biodiversity?

This activity helps students understand the importance of **biodiversity, traditional knowledge, and biotechnology**, while also showing how institutes like IHBT are using science to protect nature and support communities.

VisionAir: Purifying Air the Natural Way

Bhumi
10th Class

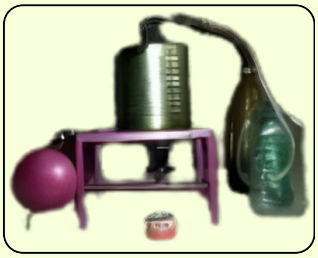
Air pollution in cities like Delhi has become a serious public health concern, contributing to asthma, lung infections, and heart diseases. While large smog towers have been installed in some areas, they are expensive and difficult to maintain. On the other hand, conventional air purifiers consume high amounts of electricity and are often too costly for small communities, schools, and low-income households. As a result, access to clean air remains limited for many people who need it the most.

VisionAir introduces a low-cost, eco-friendly Natural Smog Tower designed for homes and small public spaces. A brushless DC fan draws polluted air into the system, where it passes through multiple natural filter layers such as activated charcoal, biochar, red soil, chalk powder, coconut husk, and cotton fiber. These layers help remove dust, harmful gases, and allergens before releasing cleaner air back into the environment. The modular design allows easy cleaning and replacement of filters, ensuring long-term usability. Energy-efficient and safe, the system can be further upgraded with solar panels and air-quality sensors, offering a sustainable and accessible solution to urban air pollution.

(Source: GYS Avishkar Awards 2025 Booklet)

Link for the project's video presentation
YouTube.com/@GETAYoungScientist

Eco-Friendly Pollution Control



Plastic waste, especially polythene bags, milk pouches, biscuit wrappers, and disposable cups, has become a serious environmental concern. Being non-biodegradable, these materials accumulate in the surroundings, pollute soil and water, and contribute to long-term ecological damage. Recognising this issue, Saswati and her team collected plastic waste from areas around their school and carefully sorted it into different categories for experimentation.

The objective was not just to clean the environment, but also to explore whether this waste could be converted into something useful rather than being discarded.

Saswati Rath
8th Class

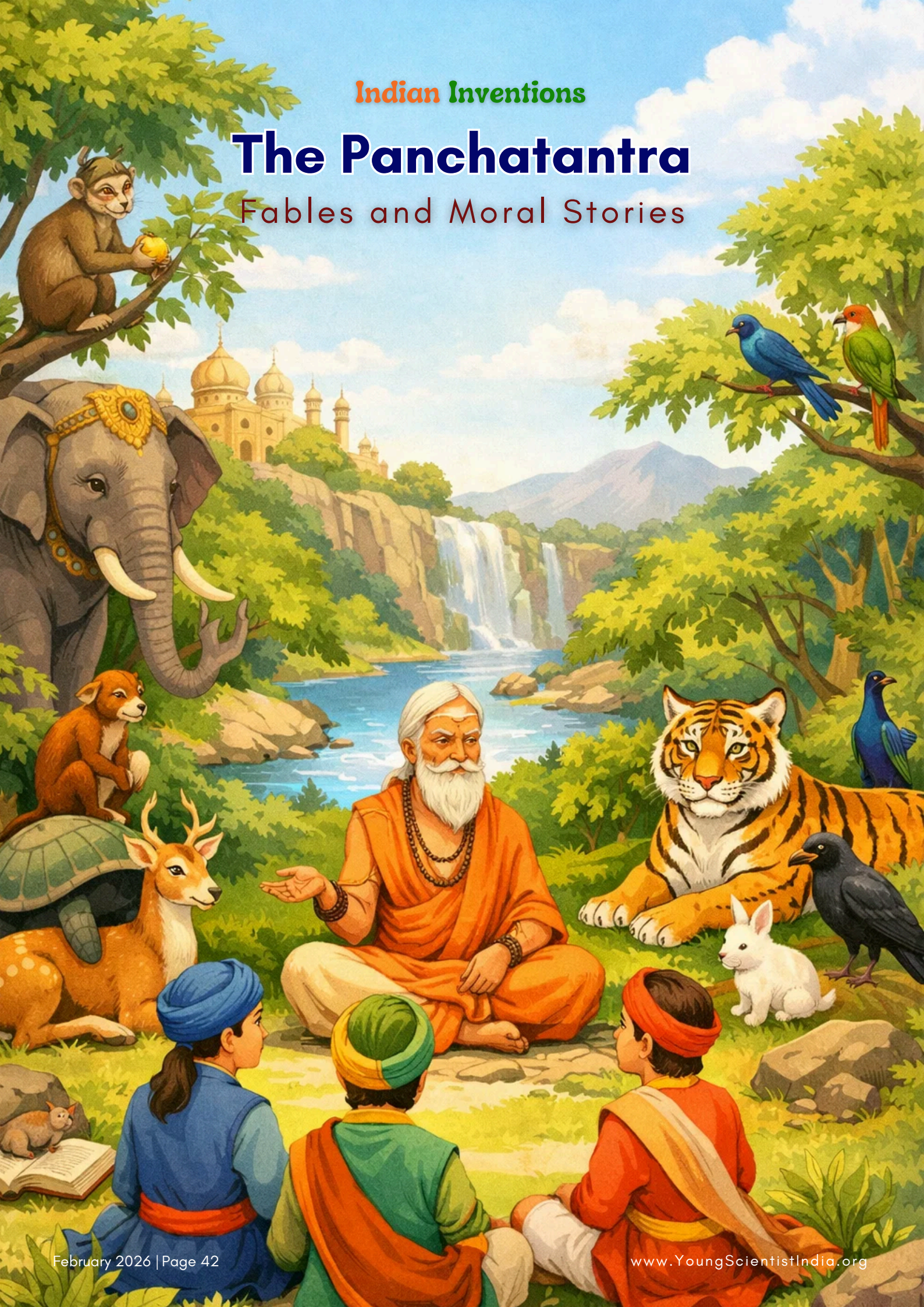
In the experiment, the sorted polythene was placed in an iron chamber and heated to high temperatures between 700–1200°C. At this stage, the plastic melted and transformed into hydrocarbon-rich gases, which were then condensed to form crude oil. On average, 1 kilogram of polythene produces around 700 grams of crude oil and nearly 150 grams of black shoe wax as a by-product. The crude oil can be used in preparing paints, lubricants, and rust-removal agents. This innovative project demonstrates a low-cost, eco-friendly method of recycling plastic waste while reducing pollution and promoting sustainable resource use.

(Source: INSPIRE MANAK NLEPC 2014 Booklet)

Indian Inventions

The Panchatantra

Fables and Moral Stories



Stories have always been one of the most powerful ways to teach lessons about life. Long before modern textbooks and classrooms existed, teachers used stories to help children understand values such as wisdom, friendship, honesty, and teamwork. One of the most famous collections of such stories from India is **The Panchatantra.**

The Panchatantra is an ancient Indian collection of **fables and moral stories,** believed to have been written around 2,000 years ago. These stories use animals as characters to teach important lessons about life, leadership, and decision - making.

The Origin of the Panchatantra

The Panchatantra is traditionally attributed to a scholar named **Vishnu Sharma.**

According to legend, a king wanted his three princes to become wise and capable rulers. However, the princes were not interested in traditional studies. So the king asked Vishnu Sharma to teach them practical knowledge in an engaging way.

Instead of using long lectures, Vishnu Sharma began telling **interesting stories about animals, kings, merchants, and travellers.** Through these stories, the princes learned important lessons about intelligence, strategy, and human behaviour.

What Does "Panchatantra" Mean?

The word Panchatantra comes from two Sanskrit words:

- **Pancha** - meaning *five*
- **Tantra** - meaning *principles or systems*

The book is divided into **five sections,** each focusing on different aspects of life such as friendship, conflict, planning, and wise decision - making.

These stories were originally meant to help young learners understand **politics, leadership, and social behaviour** in a simple and memorable way.

Famous Stories from the Panchatantra

Many well - known stories come from the Panchatantra and are still told today.

The Lion and the Clever Rabbit

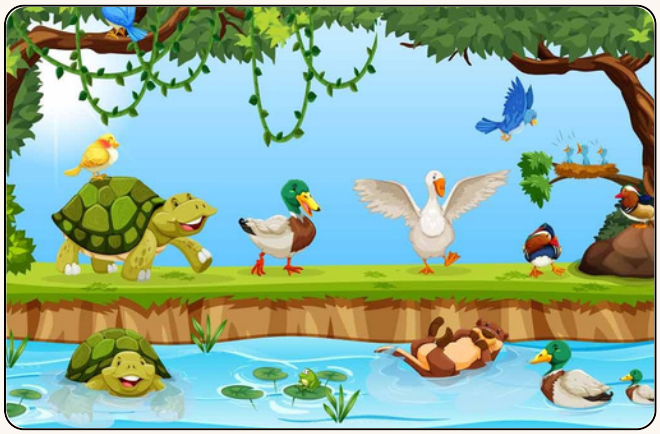
In this story, a lion terrorises animals in the forest. A clever rabbit tricks the lion into jumping into a well by making him believe another lion is inside. The story teaches that **intelligence can defeat strength.**

The Tortoise and the Geese

A tortoise wants to travel with two geese and agrees to hold a stick with his mouth while they fly. However, when people on the ground laugh at him, he opens his mouth to respond and falls. The lesson is about **the importance of self-control.**

The Monkey and the Crocodile

In this story, a crocodile tries to trick a monkey into giving up his heart. The monkey cleverly escapes using quick thinking. The story highlights the value of **presence of mind.**



Why the Panchatantra is an Innovation

The Panchatantra is more than just a collection of stories it is an early example of **educational innovation.**

Instead of teaching lessons through rules or lectures, it used:

- storytelling
- relatable characters
- humor and imagination

This made learning **fun and memorable.**

Today, many educational methods still use similar techniques. For example, animated films, story - based learning, and educational games all use storytelling to make complex ideas easier to understand.

How the Panchatantra Spread Across the World

The Panchatantra is one of the **most widely translated books in the world.** Over the centuries, it was translated into Persian, Arabic, Greek, and many European languages.

These translations influenced famous story collections such as **Aesop's Fables** and other folklore traditions.

Because of its universal lessons and engaging stories, the Panchatantra continues to be read by children and adults across the globe.

Did You Know?

The Panchatantra has been translated into **more than 50 languages** and has influenced storytelling traditions in many cultures.

Classroom Activity

Teachers can help students explore the Panchatantra through storytelling.

Ask students to:

1. Choose a Panchatantra story.
2. Act out the story as a short play in the classroom.
3. Discuss the moral lesson of the story.

Students can also create **their own modern Panchatantra story** using animals or fictional characters to teach an important value.

Conclusion

The Panchatantra is one of India's greatest contributions to world literature and education. Through simple yet powerful stories, it teaches lessons about wisdom, friendship, honesty, and problem - solving.

Even today, these stories continue to inspire readers and remind us that learning can be both **meaningful and enjoyable.**

The next time you hear a story about clever animals solving problems, remember that it may have its roots in the timeless wisdom of the **Panchatantra**.

Blind's Helping Jacket

Prithvi Raj
10th Class

For visually impaired individuals, moving independently in public spaces remains a daily challenge. Many blind persons depend on others or on walking sticks for navigation, which may not always prevent collisions or warn them about sudden obstacles, turns, or dangerous situations like fire. Despite advancements in science and assistive technology, affordable and accessible solutions are still limited, especially in rural areas. Recognising this social issue, Prithvi Raj set out to design a practical device that would enhance mobility, safety, and confidence for visually impaired individuals.

The result is a "Blind's Helping Jacket" embedded with electronic components such as sensors, radio-based circuits, solar plates for power, and a buzzer indicator system. The jacket detects obstacles and provides directional alerts for left and right turns, stops, and other movements through sound signals. It also includes a fire detection feature to warn users of potential danger. Designed to be low-cost and wearable, the jacket allows blind individuals to walk and even move freely without constant support.

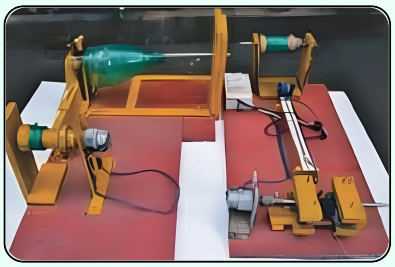
This thoughtful innovation aims to empower visually impaired persons with greater independence, safety, and awareness in everyday life.

(Source: INSPIRE MANAK NLEPC 2015 Booklet)

Self Operating Plastic Bottle Recycling Machine

Prachi Mahadik
7th Class

Plastic waste has become one of the most serious environmental challenges, as materials like plastic bottles are used widely but take years to decompose, causing pollution in landfills, drains, and water bodies. To address this issue, Prachi Mahadik designed an innovative self-operating plastic bottle recycling machine that transforms discarded bottles into useful plastic threads. The system works using a solar panel connected to a 12-volt battery, which powers a 10 RPM motor.



This motor converts electrical energy into mechanical energy to operate sharpened blades and a heating coil, cutting and processing the bottles into continuous threads. Built with simple components like iron plates, the machine effectively demonstrates the use of renewable energy for practical applications. The plastic threads produced can be reused for various purposes, reducing waste and promoting sustainability.

This project highlights how scientific thinking and clean energy can work together to create eco-friendly solutions for a pollution-free environment.

(Source: INSPIRE MANAK NLEPC 2015 Booklet)

Indian Scientist

Venkatraman Ramakrishnan

Padma Vibhushan

Born On 5 April 1952

Every cell in our body works like a tiny factory, constantly producing the molecules needed for life. One of the most important machines inside these cells is the **ribosome**, which reads genetic instructions and builds proteins. The scientist who helped reveal how this microscopic machine works is **Venkatraman Ramakrishnan**.

Venkatraman Ramakrishnan, often called **Venki Ramakrishnan**, was born in 1952 in Chidambaram, Tamil Nadu. Both his parents were scientists, which encouraged his curiosity about science from an early age. Interestingly, Ramakrishnan did not begin his career in biology. He first studied **physics**, but later became fascinated by biology and shifted his focus to understanding the molecular structures that make life possible.

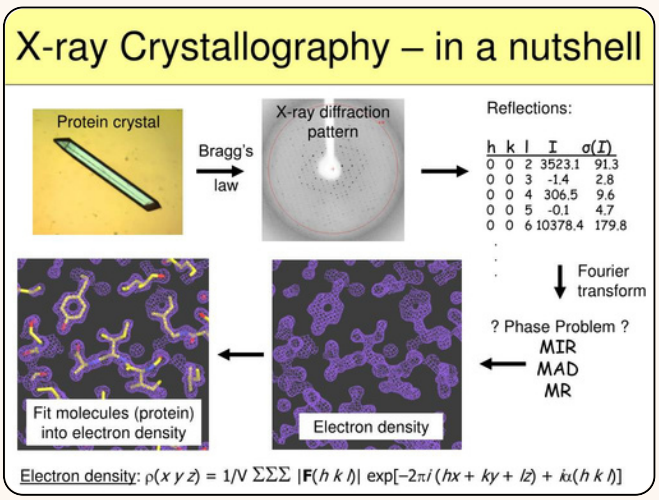
His most famous discovery involved studying the **ribosome**, the tiny structure inside cells that builds proteins using instructions from DNA. Proteins are essential for almost every process in the body, including muscle movement, immune defense, and cell growth. However, for many years scientists did not fully understand the detailed structure of the ribosome.

Using advanced techniques such as **X-ray crystallography**, Ramakrishnan and his team were able to map the structure of the ribosome at the atomic level. This breakthrough helped scientists understand how ribosomes read genetic information and assemble amino acids to create proteins.

For this groundbreaking discovery, Ramakrishnan shared the **Nobel Prize in Chemistry in 2009** with two other scientists. Their work also helped researchers develop better **antibiotics**, since many antibiotics work by targeting bacterial ribosomes.

Throughout his career, Ramakrishnan has continued to promote scientific research and education. He later served as the president of the Royal Society, one of the oldest and most prestigious scientific institutions in the world.

Venkatraman Ramakrishnan's journey shows that curiosity and persistence can lead to extraordinary discoveries. By revealing how one of life's most important molecular machines works, he helped scientists better understand the basic processes that keep all living organisms alive.



Solution
Sudoku Challenge 2602

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

Solution
Word Search 2602

Riddle 2602 Answer

1. Computer 2. Wheel 3. Star 4. Fire 5. Communication.

UPCOMING CONTESTS

GYS SAMASYA KHOJ 2026

A National Problem Identification Competition for High School Students

Submissions Open

MAR TO JUN 2026

GYS GURU PURASKAR 2026

A National Video Submission Contest Online for Working Teachers

Submissions Open: April 2026 to June 2026

GYS Avishkar 2025 AWARDS

Grooming Student Innovators for the Nation

Submissions Open: May 2026 to July 2026