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Young Scientist India

A Science & Innovation Magazine for School Students

INDIAN INNOVATIONS IN THE 21ST CENTURY

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ETHICS IN INNOVATION
FROM IDEA TO IMPACT
ROBOTICS IN EVERYDAY LIFE

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Young Scientist India

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From the Editor's Desk

Welcome, Young Scientists!

Greetings to our bright, curious, and ever-questioning readers. It brings me great joy to present another inspiring edition of Young Scientist India, thoughtfully curated to spark ideas, strengthen skills, and nurture innovation with responsibility and purpose.

Our Cover Story, **Indian Innovations in the 21st Century**, invites you to explore how modern India is shaping the future through science and technology. From digital breakthroughs to transformative solutions, today's innovators are solving real-world challenges with creativity and determination. It reminds us that innovation is not defined by age, but by curiosity, courage, and commitment to progress.

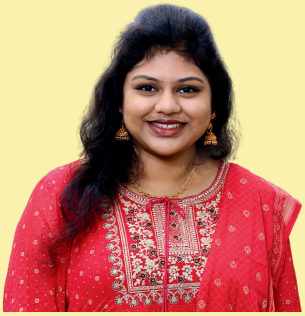
Innovation is not only about building new things, but about thinking wisely and acting responsibly. This month's Innovation Training Modules – **Ethics in Innovation** and **From Idea to Impact** - guide you through two essential aspects of the innovation journey. Ethical thinking helps us question whether our ideas truly serve society, while learning how to move from concept to execution ensures that our solutions create measurable change. Together, they encourage you to innovate with both conscience and confidence.

Curiosity takes centre stage in this issue through articles that connect science to everyday life. In **Robotics in Everyday Life**, you will discover how intelligent systems quietly assist us through automation and smart devices. **Reinventing Recycling** challenges you to see waste as an opportunity for sustainability and creative problem-solving. **How Algorithms Work** simplifies the logic behind the digital tools you use daily, showing how structured thinking powers technology. Together, these stories reveal that science is practical, present, and powerful.

We also celebrate India's rich legacy in Indian Inventions & Innovations. From simple yet impactful creations like Buttons and Flush toilets to the philosophical depth of Buddhism and Jainism, India's contributions reflect both practical ingenuity and intellectual strength. This spirit continues through our profiles of inspiring Indian scientists and the remarkable work of leading national research institutions that advance knowledge across fields.

I hope this edition encourages you to observe closely, think ethically, and transform ideas into meaningful impact.

Stay curious. Keep questioning. The future is yours to invent.



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S&I Article

Robotics in Everyday Life

When you hear the word robot, what comes to your mind? A shiny metal humanoid from a movie? A talking machine from the future?

Surprise! Robots are already living among us – not as superheroes, but as hardworking helpers quietly making our daily lives easier.

Let's explore how!

🏠 Robots at Home

Have you seen a small, round machine moving around the floor, cleaning dust without anyone pushing it? That's a robot vacuum! It uses sensors to detect walls and furniture, maps the room, and cleans on its own.

Even washing machines and dishwashers use robotic automation. They follow programmed instructions to wash, rinse, and spin all without constant human control. So next time your clothes are washed while you're studying, thank a robot!

🏭 Robots in Factories

Most of the cars, phones, and toys we use are built with the help of robots. Large robotic arms lift heavy objects, weld metal, and assemble parts with incredible precision.

Why use robots in factories?

- They work faster.
- They don't get tired.
- They can handle dangerous tasks.

This doesn't mean humans are replaced. Instead, humans design, program, and supervise robots. It's teamwork between people and machines!

🏥 Robots in Hospitals

In some hospitals, robots assist doctors during surgeries. These robotic systems allow doctors to perform operations with greater accuracy and smaller cuts.

There are also robotic wheelchairs, rehabilitation robots, and even robots that deliver medicines inside hospitals.

Imagine a robot helping someone walk again after an injury, that's robotics changing lives.

🚗 Robots on the Road

Self-driving cars use robotic technology, cameras, and artificial intelligence to detect traffic signals, pedestrians, and other vehicles.

Delivery robots are being tested in many cities. Instead of a delivery person, a small robot rolls up to your door with your food order!

📱 Robots in Your Pocket?

You might not see it, but even your smartphone uses robotic principles. Face recognition, voice assistants, and automated features are all part of robotics and AI working together.

When you say, "Set an alarm for 6 AM," and your phone listens, that's intelligent automation in action.

🤔 So, What Is a Robot Really?

A robot is simply a machine that can sense its surroundings, make decisions, and act - either automatically or with minimal human control.
It doesn't have to look like a human. It just needs to:

1. **Sense** (using sensors)
2. **Think** (using programs or AI)
3. **Act** (using motors or movement)

🌟 Why This Matters for You

Robotics is not just for scientists in labs. It's for problem-solvers - students like you.

Can you design a robot that waters plants automatically?
Or one that sorts garbage into recyclable and non-recyclable bins?

Robotics combines science, creativity, coding, and imagination. It helps us solve real-world problems.

The future isn't about robots taking over the world. It's about humans and robots working together to build a smarter, safer, and more efficient planet.

And who knows?
The next robot that changes the world might be designed by you. 🚀

Sudoku Challenge 2512

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

(Answers on Back Cover Inside)

Seat Belt School Bag for 2 Wheelers

KM. Pia Basar
8th Class

The Seat Belt School Bag is an innovative child - safety solution designed to protect school - going children who travel as pillion riders on two - wheelers. Many children commute daily without any proper restraints, making them vulnerable to falls and serious injuries during sudden braking, sharp turns, or traffic disturbances. Parents often depend on unsafe, makeshift arrangements due to the lack of affordable, child-specific safety products in the market.

This issue is especially critical in both rural and urban areas where two-wheelers are a primary mode of transport. The Seat Belt School Bag addresses this gap by integrating safety directly into a commonly used school accessory. Lightweight, ergonomic, and practical, the design also includes reflective strips to improve visibility during early mornings or night travel. Its adaptability to most two-wheelers through simple modifications makes it suitable for widespread community adoption.

The solution integrates a seat belt mechanism into the school bag itself. The belt securely fastens the child to the rider's waist or the vehicle frame, preventing sudden falls. Made from durable, child-safe materials, it is adjustable for comfort and growth. The DIY-friendly design allows easy retrofitting of existing bags at minimal cost, making child safety accessible and affordable.

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

(Source: GYS Avishkar Awards 2025 Booklet)

Digital Microscope

Sushil Thomas David
7th Class

This project presents a low-cost digital microscope created using a simple webcam. Conventional microscopes are often expensive and inaccessible in many schools, limiting practical science learning. This innovation enables students to observe microscopic objects directly on a computer screen, making science education more interactive and affordable.

It allows easy observation, comparison, and documentation of specimens, encouraging hands-on experimentation. By using commonly available hardware and free software, the project demonstrates how everyday technology can be adapted for basic scientific research and classroom learning.

A webcam is mounted on a platform with its lens inverted to achieve magnification. A mirror placed below reflects light onto the specimen held on the stage. The webcam connects to a computer running Cheese software on Ubuntu, displaying a live magnified image. Students can observe specimens like onion peel, algae, or Colocasia and save snapshots for study.

(Source: INSPIRE MANAK NLEPC 2013 Booklet)

Science & Innovation Lab

Central Leather Research Institute

Have you ever worn leather shoes, used a wallet, or carried a school bag made of leather? Behind many such everyday products lies fascinating science—and one of India's most important institutes in this field is the **Central Leather Research Institute (CLRI).**

Established in **1948** and located in **Chennai, Tamil Nadu,** CLRI works under the **Council of Scientific and Industrial Research (CSIR).** It is one of the world's largest research institutes dedicated entirely to **leather science and technology.** Its main aim is to make leather products **better in quality, safer to use, and more environmentally friendly.**

At CLRI, scientists study leather from start to finish. They research how animal hides are processed, how leather is treated, and how it can be converted into useful products like footwear, garments, car seats, and accessories. This work involves subjects such as **chemistry, biology, material science,** and **engineering,** making CLRI a truly multidisciplinary institute.

One of CLRI's most important contributions is in sustainable and eco-friendly leather processing. Traditional leather-making can pollute water and harm the environment. CLRI scientists have developed cleaner technologies that reduce water use, recycle chemicals, and minimize waste. These innovations help protect rivers and ecosystems while supporting industries.

CLRI also supports India's large leather industry by working closely with factories, designers, and exporters. Many modern leather products used in India and sold across the world are based on technologies developed at CLRI. The institute also provides training to students, technicians, and entrepreneurs, helping young people build careers in science and industry.

For school students, CLRI is a great example of how **science meets design and sustainability.** It shows that science is not limited to laboratories—it shapes what we wear and use every day. If you enjoy experimenting, solving practical problems, or creating things that are useful and stylish, CLRI shows how science can turn curiosity into real-world impact. Who knows—your next science idea could help make the leather industry greener and smarter!

Indian Scientist

Dr. Ritu Karidhal Srivastava

(Born on 13 April 1975)

Space exploration is often associated with rockets and satellites, but at its core, it is about people who plan carefully, solve complex problems, and make precise decisions. One such inspiring Indian scientist is **Ritu Karidhal Srivastava,** a senior scientist at the **Indian Space Research Organisation (ISRO),** whose work has played a major role in India's journey to space.

Ritu Karidhal Srivastava is widely known as the "Rocket Woman of India." She served as the **Mission Director of Chandrayaan-2**, India's ambitious second mission to the Moon. As Mission Director, she was responsible for planning mission operations, coordinating teams, and ensuring that each stage of the mission worked smoothly. Although the Vikram lander could not complete a soft landing, the mission successfully placed an orbiter around the Moon, which continues to send valuable scientific data. This experience became a learning milestone for future missions like Chandrayaan-3.

Before Chandrayaan-2, she played a key role as Deputy Operations Director of the Mars Orbiter Mission **(Mangalyaan).** This historic mission made India the first country to reach Mars orbit on its first attempt, earning global appreciation for India's scientific capability and efficient engineering.

Ritu Karidhal's work involves applying **physics, mathematics, computer science, and systems engineering** to real-world challenges. Her career shows students how classroom subjects are used together to solve practical problems, such as navigating spacecraft, managing fuel, and communicating with satellites millions of kilometres away.

Her journey is especially inspiring because it reflects years of discipline, teamwork, and calm decision-making under pressure. She joined ISRO as a young scientist and steadily grew by learning from every mission and challenge. She has often spoken about the importance of focus, consistency, and confidence in one's abilities.

For school students, Ritu Karidhal Srivastava's life teaches important lessons. She shows that success in science does not happen overnight, that mistakes are part of learning, and that teamwork is essential in big projects. Most importantly, her story proves that dedication and curiosity can take students from classrooms in India to missions exploring the Moon and Mars.

Indian Inventions

Buttons

A small invention that changed how the world dressed

Buttons are so common today that we rarely stop to think about them. Found on shirts, coats, school uniforms, bags, and even shoes, buttons quietly hold our lives together quite literally. Yet few people know that one of the earliest uses of buttons comes from ancient India, making them a remarkable example of how simple Indian innovations shaped everyday human life across the world.

What Is a Button?

A button is a small object used to fasten clothing or accessories, usually by passing it through a loop or buttonhole. While modern buttons are often made of plastic or metal, early buttons were crafted from natural materials such as shell, bone, wood, and stone

Though buttons today are associated mainly with fashion, their earliest role was decorative, and that is where India's story begins.

Ancient India and the First Buttons

Archaeological evidence shows that some of the earliest known buttons were discovered in the Indus Valley Civilization, one of the world's oldest urban civilizations.

Buttons dating back nearly 5,000 years have been found at sites such as Mohenjo-daro and Harappa. These buttons were often made from shells and featured carefully drilled holes, showing advanced craftsmanship and design skills.

Interestingly, these early Indian buttons were not only functional they were also ornamental, used to decorate garments and accessories. This shows that ancient Indians understood both utility and aesthetics, blending function with beauty.

Why Buttons Were an Innovative Idea

The invention and use of buttons was a quiet but powerful innovation:

- **Improved clothing design:** Buttons allowed clothes to fit better and stay securely in place
- **Durability:** Compared to simple knots or ties, buttons were stronger and longer-lasting
- **Social expression:** Buttons also reflected status, taste, and identity

- **Skillful craftsmanship:** Creating small, symmetrical objects with holes required precision tools and planning

This small invention played a major role in the evolution of clothing from loose drapes to more structured garments.

Buttons and Indian Culture

In ancient and medieval India, clothing styles varied widely across regions, climates, and communities. Buttons became part of this diversity appearing on tunics, coats, and ceremonial garments. Over time, buttons were made from ivory, metals, gemstones, and wood, especially for royalty and nobility.

Even today, traditional Indian clothing like sherwanis, bandhgalas, and jackets use decorative buttons that are as much about style as they are about function. This continuity highlights how ancient ideas adapt without losing cultural identity.

From India to the World

While buttons existed in ancient India primarily as ornaments, the idea slowly spread across trade routes to other civilizations.

Centuries later, buttons became functional fasteners in Europe, especially during the Middle Ages, revolutionizing fashion there.

This global journey of buttons reminds us that innovation does not always spread instantly. Sometimes, ideas wait centuries before the world fully understands their value.

Modern Buttons: Evolved but Familiar

Today, buttons are mass-produced using advanced machinery and materials like plastic, metal alloys, and recycled composites.

Some modern innovations include:

- Eco - friendly buttons made from coconut shell or recycled fabric
- Smart buttons integrated with sensors in wearable technology
- Designer buttons used as statement fashion elements

Despite all these changes, the basic concept remains the same as it was in ancient India a small object solving a simple problem effectively.

Why Buttons Matter for Students

The story of buttons teaches powerful lessons:

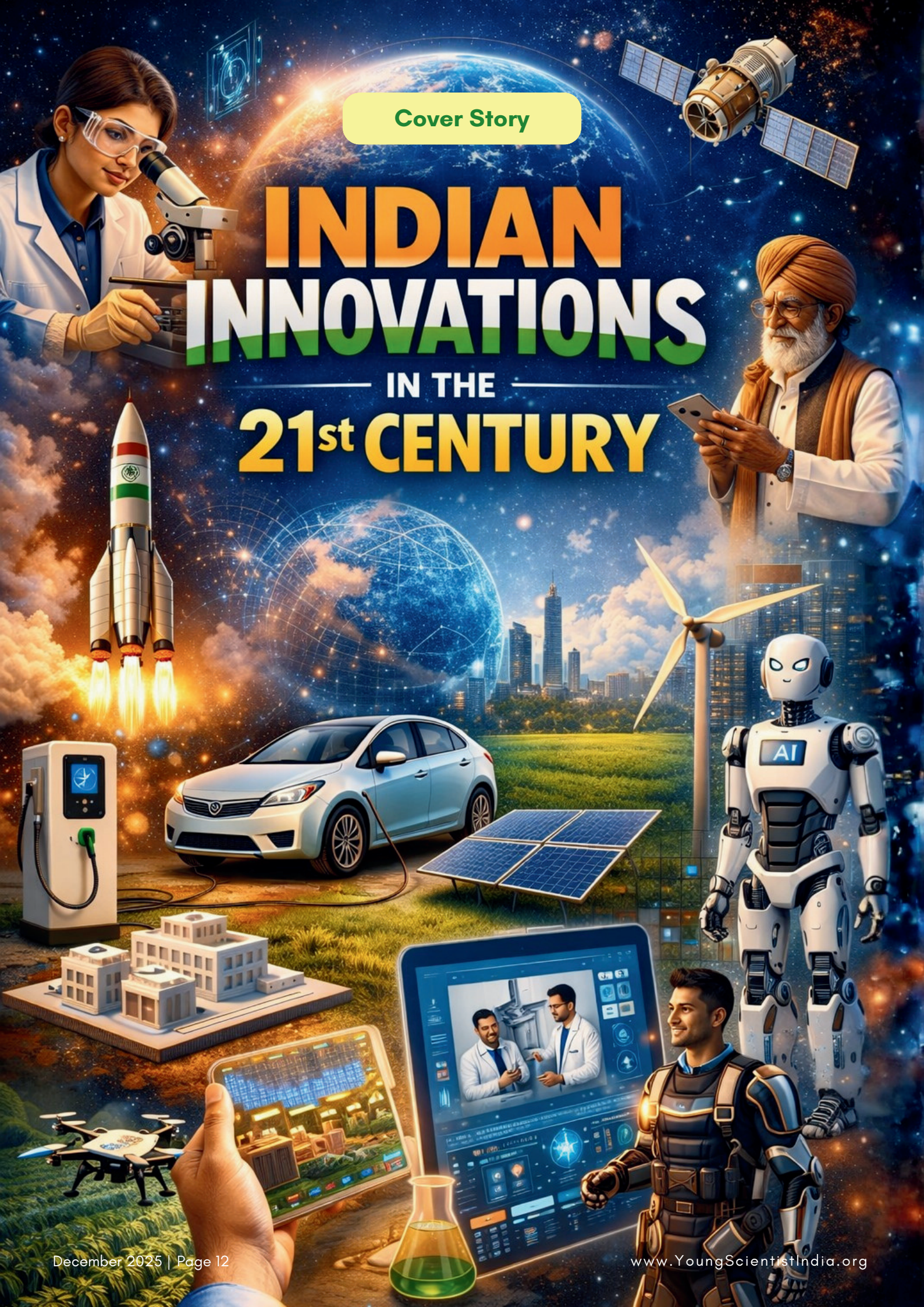
- Innovation can be small and simple
- Everyday objects have deep histories
- Indian civilizations contributed to daily - life technologies, not just monuments or texts
- Design thinking existed thousands of years ago

For students, buttons show that observation, creativity, and practicality are the foundations of innovation.

A Small Object, A Big Legacy

Buttons may not look like groundbreaking inventions, but their impact on human life is undeniable. From shell buttons in the Indus Valley Civilisation to modern garments worn worldwide, this humble invention reflects India's long tradition of thoughtful design.

In understanding buttons as an Indian innovation, we learn an important truth: great ideas don't have to be loud or complex, they just have to work.


Cover Story
INDIAN INNOVATIONS IN THE 21st CENTURY
AI

The 21st century belongs to nations that can innovate – not just invent, but solve real problems at scale. India, with its young population, diverse challenges, and rapidly growing digital ecosystem, has emerged as one of the world's most exciting innovation hubs.

From space missions that reach Mars on a budget to digital payment systems used by millions daily, Indian innovations today are practical, scalable, and people – centred. They are not always about luxury – they are about access, affordability, and impact.

Let's explore some of the most inspiring Indian innovations of the 21st century.

🚀 Space Innovation: Reaching the Stars

India's space journey in the 21st century has amazed the world.

In 2014, India became the first Asian country to reach Mars orbit in its very first attempt through the **Mars Orbiter Mission**, popularly called Mangalyaan.

What shocked the world was not just the success, but the cost. It was completed at a fraction of what other nations typically spend.

In 2023, India made history again with **Chandrayaan-3**, becoming the first country to land near the Moon's south pole. This mission demonstrated precision engineering, indigenous technology, and scientific courage.

These achievements by the **Indian Space Research Organization** prove that innovation is not about spending more, it is about thinking smarter.

One of the most transformative innovations of modern India is the **Unified Payments Interface (UPI)**.

Developed by the **National Payments Corporation of India**, UPI allows instant bank-to-bank transfers through a mobile phone. Today, even a small tea seller in a village accepts digital payments using a simple QR code.

UPI has:

- Reduced dependence on cash
- Increased transparency
- Boosted small businesses
- Enabled financial inclusion

India's digital payment ecosystem is now studied globally as a model for inclusive innovation.

💉 Healthcare Innovation: Affordable and Scalable

When the COVID-19 pandemic struck, innovation became a necessity.

India developed **COVAXIN**, an indigenous vaccine created through collaboration between Indian scientists and biotech companies. Alongside this, the government launched the **CoWIN platform**, a digital system that managed billions of vaccination records efficiently.

Another major innovation of the 21st century is **Aadhaar**, the world's largest biometric identification system. Aadhaar has enabled direct benefit transfers, reducing leakages in welfare schemes and ensuring subsidies reach the right people.

India's strength lies in combining technology with public welfare.

Agricultural Innovation: Technology for Farmers

Agriculture remains the backbone of India. In the 21st century, innovation has entered the fields.

The **Soil Health Card Scheme** helps farmers understand soil nutrients and apply the right fertilizers. Drones are now used for crop monitoring and spraying. Agri - tech startups provide weather forecasts, market prices, and advisory services directly to farmers' phones.

These innovations are increasing productivity while reducing costs and environmental damage.

🌱 Sustainable Innovation: Green Energy and Environment

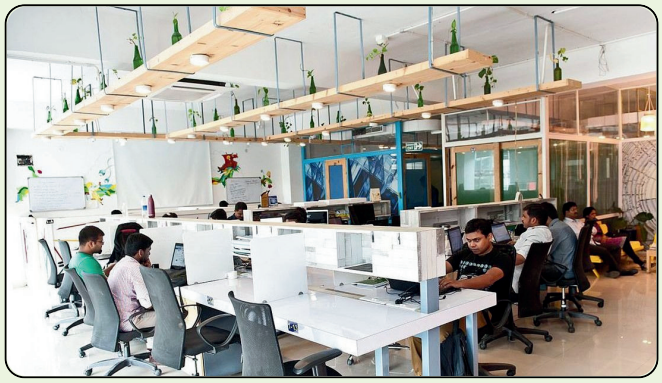
India is also innovating toward a sustainable future.

The **Bhadla Solar Park** is one of the largest solar parks in the world. Across states like Tamil Nadu and Gujarat, wind energy installations are transforming the energy mix.

Electric vehicle startups, rooftop solar initiatives, and green hydrogen research are pushing India toward cleaner growth.

Sustainable innovation shows that development and environmental responsibility can go together.

🧠 Startup Ecosystem: Young Minds, Big Ideas



India is now one of the largest startup ecosystems in the world. Cities like Bengaluru, Hyderabad, and Pune have become innovation hubs.

Startups are solving problems in:

- Education technology
- Health diagnostics
- Renewable energy
- Artificial intelligence
- Rural logistics

Unlike traditional business models, many Indian startups focus on affordability and scale. Their goal is not just profit – but impact.

What Makes Indian Innovation Unique?

Indian innovation in the 21st century stands out for three reasons:

1. Frugal Engineering

Doing more with fewer resources.

2. Scale

Solutions designed for millions – not just thousands.

3. Inclusion

Innovations that aim to uplift the poorest and most remote communities.

From space missions to street – level digital payments, India demonstrates that innovation is not limited to laboratories. It happens in classrooms, villages, startups, and government systems.

The Road Ahead

India is home to one of the youngest populations in the world. This demographic advantage, combined with digital access and scientific ambition, makes the future exciting.

Emerging areas like artificial intelligence, quantum computing, biotechnology, and climate technology will define the next chapter of Indian innovation.

But innovation is not just about technology. It is about mindset – curiosity, courage, and commitment to solving real problems.

The 21st century has already shown us that Indian innovation is bold, practical, and people – centered. The next breakthrough might come from a research lab, a rural classroom, or even from a student reading this magazine.

The question is not whether India will innovate.

The question is: **What will you innovate next?**

Time - Saving Grains Packaging Helper

This project introduces a simple, manually operated device that speeds up, simplifies, and improves the efficiency of packaging white grains such as rice and dal. Traditional grain packaging is highly labour-intensive, often requiring three to six people, which increases costs and reduces productivity for small-scale farmers and local producers. Limited access to affordable machinery further restricts their ability to scale operations and improve income. Designed using recycled materials such as toy wheels, waste wood, discarded rice bags, and metal sheets, this device is both eco-friendly and extremely low-cost. By enabling a single person to perform tasks that previously needed multiple workers, the innovation saves time, reduces labour dependency, and supports sustainable production practices, especially for small and marginal producers.

Tachok Nayam
10th Class

The solution is a manually operated packaging mechanism built entirely from reused and easily available materials. Its simple design allows one person to package grains efficiently without electricity or complex tools. Costing as little as ₹20 to construct, the device is affordable, easy to replicate, and ideal for rural and small-scale settings. It enhances productivity while promoting recycling and environmentally responsible innovation.

(Source: GYS Avishkar Awards 2025 Booklet)

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

Multipurpose Bicycle

This model demonstrates a solar-powered cycle designed for both transportation and agricultural applications. Solar energy is captured through a 12-volt solar panel and stored in a battery. The stored energy powers a motor that drives the cycle's wheels using a multi-chain system. To enhance functionality, two side tyres with a carrier are attached to the rear wheel, allowing the cycle to perform farming tasks such as ploughing, seed sowing, and watering. ThisThe model is built using simple and easily available materials, including a solar panel, dynamo, electrical wiring, switches, ploughing tools, watering equipment, extra wheels, metal strips, and basic fittings.

Indrajeet Singh
10th Class

The solar-powered cycle has wide practical applications. It helps students travel easily from sub-hill and rural areas to schools and supports farmers by reducing dependence on bull-based ploughing. The cycle is low-cost, eco-friendly, and easy to maintain, making it accessible to rural communities. It also enables long-distance travel, easy transport of goods, and has potential for employment generation through local manufacturing and agricultural use.

(Source: INSPIRE MANAK NLEPC 2016 Booklet)

Indian Scientist

Dr. Shiraz Naval Minwalla

(Born on 2 January 1972)

When we think of scientists, we often imagine people working with test tubes or machines. But some scientists explore the universe using ideas, equations, and deep thinking. One such remarkable Indian scientist is **Shiraz Naval Minwalla,** a world-renowned theoretical physicist who has made important contributions to modern physics.

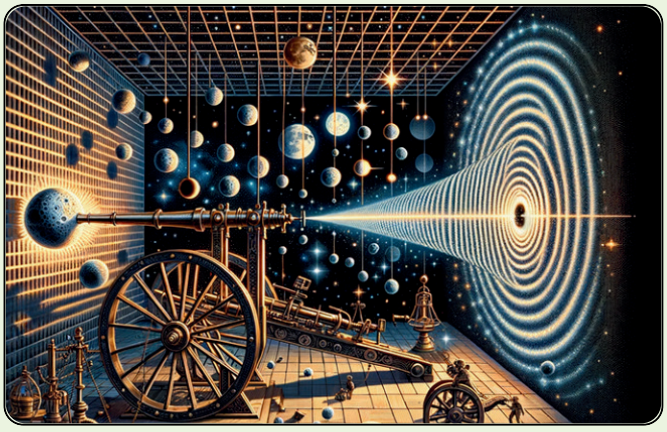
Shiraz Minwalla is best known for his work in **theoretical high-energy physics,** a field that tries to understand the most fundamental laws of nature—how particles, forces, space, and time behave at the deepest level. He is a professor at the **Tata Institute of Fundamental Research (TIFR),** Mumbai, one of India's most prestigious science institutions.

One of Minwalla's major contributions is in the study of **quantum field theory** and **string theory.** These are advanced areas of physics that attempt to explain how the universe works at extremely small scales, far beyond what we can see. His research has helped scientists better understand the relationship between gravity and quantum mechanics, two of the most important but difficult ideas in modern science. His work is read and respected by physicists all over the world.

What makes Shiraz Minwalla especially important to Indian science is that he chose to **build cutting-edge research within India**, rather than only working abroad. By doing so, he has helped strengthen India's position in global theoretical physics and inspired a new generation of young researchers. Many students trained under him have gone on to become leading scientists themselves.

For school students, Shiraz Minwalla's journey offers powerful lessons. First, it shows that **curiosity and deep thinking matter** just as much as experiments. Second, it teaches that you do not need to leave your country to do world-class science—you can contribute globally while working in India. Finally, his career reminds us that science is not just about quick results, but about patience, discipline, and a love for understanding how the universe truly works.

Minwalla's career also highlights the importance of strong foundations in mathematics and physics. His success shows students that mastering basics, asking thoughtful questions, and enjoying the process of learning are just as important as talent or intelligence.



Einstein's Gravity with Quantum Mechanics

Innovation Training Module

Ethics In Innovation

RESPONSIBILITY - BALANCE - SAFETY

Just Because We Can, Should We?

We live in an exciting time.

- You can ask an AI tool to write a poem.
- You can edit photos with a tap.
- You can design a robot in school.
- You can build an app before turning eighteen.

Technology has given your generation superpowers.

But here is the real question:

Just because we can create something, does it mean we should?

This is where Ethics in Innovation begins.

What Is Ethics?

Ethics simply means understanding **what is right and what is wrong,** and acting responsibly.

It is about:

- Fairness
- Responsibility
- Honesty
- Long - term consequences
- Respect for people and the planet

Innovation without ethics can be dangerous.
Innovation with ethics can change the world for the better.

Being a young innovator is not only about intelligence.
It is about character.

When Innovation Goes Wrong

Let's look at some real - life situations students can relate to.

1. AI for Homework

Imagine you create an AI tool that writes assignments in seconds.

It saves time and It looks impressive.

But:

- Does it reduce learning?
- Is it fair to students who don't use it?
- Does it create dependency?

The technology is powerful. But how it is used matters.

2. Social Media Algorithms

Social media platforms use smart systems to keep people scrolling.

More scrolling means:

- More advertisements
- More profit

But it can also mean:

- Addiction
- Reduced attention span
- Mental health issues

Was the goal connection - or profit at any cost?

3. Cheap Plastic Innovation

Suppose you invent a new low - cost plastic product that becomes very popular.

It improves convenience. It increases sales.

But it also:

- Adds to ocean pollution
- Harms wildlife
- Creates long - term waste problems

Innovation must look beyond short-term success.

The Power and Responsibility of Creators

In the past, only a few scientists and big companies created technology.

Today:

- Students build apps
- Teenagers design AI models
- Young people create startups

You are not just users anymore. You are creators. And creators carry responsibility.

The 5 Ethical Questions Every Innovator Must Ask

Before building any solution, ask yourself these five powerful questions:

1. Who Benefits?

- Is this helping people?
- Which group benefits the most?

2. Who Might Be Harmed?

- Could this solution negatively affect someone?
- Does it exclude certain groups?

3. What Happens If This Scales?

- It may work well for 10 people.
- But what if 10 lakh people use it?
- Will the environmental impact increase?
- Will misuse become easier?

4. Is It Fair?

- Does everyone have equal access?
- Is the system biased?

For example:
If facial recognition works better for certain skin tones, is that fair?

5. Would I Accept This If I Were Affected?

If you were the one harmed by this innovation, would you still support it?

This question builds empathy – the heart of ethical thinking.

Innovation and Sustainability

Ethics is deeply connected to sustainability.

When you innovate, consider:

- Does it waste resources?
- Does it increase pollution?
- Does it depend on rare materials?
- Can it be reused or recycled?

An ethical innovator designs with the planet in mind.

For Example:
Instead of creating another plastic bottle, can you design a refill system?

Instead of increasing electricity use, can you design energy – efficient solutions?

Innovation must think long – term – not just about convenience.

Ethical Dilemmas: Think and Discuss

Here are some classroom discussion scenarios:

Scenario 1

You invent an app that tracks student performance and predicts who may fail exams.

It helps teachers intervene early.

But:

- Should students be labeled early?
- Could it affect their confidence?
- Who controls the data?

It helps teachers intervene early.

But:

- Should students be labeled early?
- Could it affect their confidence?
- Who controls the data?

Scenario 2

You design a drone that can monitor forests to prevent illegal logging.

But the same drone can be used to spy on people.

These are not easy questions. And that is the point.

Ethics is not about simple answers. It is about careful thinking.

The Difference Between Smart and Wise

A smart innovator asks: "How can I build this?"

A wise innovator asks: "Should I build this?"

Wisdom considers:

- Society
- Environment
- Future generations

History shows us something important: Technology is never neutral. It always shapes the world in some way.

You have the power to shape that direction.

Building Ethical Habits Early

You don't need to wait until you become a scientist or entrepreneur.

You can start now:

- Credit sources honestly.
- Avoid plagiarism.
- Respect data privacy.
- Reduce waste in projects.
- Design inclusive solutions.

Small habits create responsible innovators.

Ethics and Courage

Sometimes ethical decisions are not popular.

You may:

- Lose quick profit
- Take more time
- Face criticism

But ethical choices build trust. And trust builds long - term impact.

The most respected innovators in the world are those who combine:

- Intelligence
- Integrity
- Responsibility

Activity: Ethical Innovation Checklist

Before finalizing any project, write down:

1. What problem am I solving?
2. Who benefits?
3. Who could be harmed?
4. What environmental impact does this have?
5. How can I reduce negative consequences?

Make this checklist a habit in every project.

The Future Needs Responsible Innovators

Your generation will build:

- Artificial intelligence systems
- Climate solutions
- Medical technologies
- Smart cities

The question is not whether innovation will happen.

It will.

The real question is: Will it be responsible?

Innovation can either:

- Increase inequality
- Damage ecosystems
- Manipulate behavior

Or it can:

- Improve education
- Protect nature
- Strengthen communities

The difference lies in ethical thinking.

Final Thought

Being innovative is impressive. Being ethical is powerful.

Great innovators are not remembered only for what they built – but for how responsibly they built it.

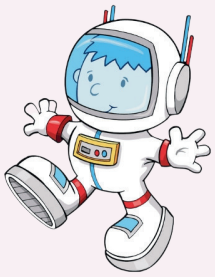
As a young scientist, remember: Your intelligence gives you the ability to create. Your ethics give you the wisdom to create wisely.

And the world needs both.

Word Search 2512

(I Could Be an Astronaut)

M D E L F A S T R O N A U T Q Y F C S V X
Z K L A W N O O M B N C N W A F K J Z R J
W Q E H J B U I A E D B I O D B P P M E R
R P B S N S A L L Y R I D E I K I A E H E
D I E U Z C Y D V B U P P A G T E E T H D
B L O R P G R Y V M W E T J Z J A L N H N
G O X R Q J D U H T F M A A E O T T E Y A
Q T E K C O R E O K T M Z M M H A T S T M
Y U R I G A G A R I N C I W F N I U Y H M
G N I N I A R T V Q K S M G R G Z H U G O
C W X X S P C J P G O O N H V L K S Q I C
H R I A N I Y A P N A I G M Z E D Q E L T
N R C S N F Y M X G T X Q O F N L F C F N
L T A A G N O R T S M R A L I E N F A E E
N R S N W K W E I G H T L E S S R P C G
G R A V I T Y T O U H Z F Y U U C D S A Y
C P B U Z Z A L D R I N S T R E S S R P X
R Q G R S G L S L T I U S E C A P S E S O
N U A J Q O K C G W J H W A S L Y B T H E
B K I O P H B L U Z Z I P D X H C N U A L
K J B A L L R O L I A S R A T S Y E O B S



Directions: Find and circle the vocabulary words in the grid. Look for them in all directions including backwards and diagonally.

Apollo	Nasa	Spaceflight
Astronaut	Neil Armstrong	Spacesuit
Buzz Aldrin	Outer Space	Star Sailor
Commander	Oxygen	Station
Gravity	Pilot	Testing
John Glen	Rocket	Stress
Launch	Sally Ride	Training
Mae Jemison	Shuttle	Weightless
Moonwalk	Spacecraft	Yuri Gagarin

(Answers on Back Cover Inside)

Pine Needle Fire Starter Bricks

Tenzin Yangzom
9th Class

This project focuses on converting dry pine needles found abundantly in Tawang into eco-friendly fire starter bricks, offering a sustainable solution to environmental, energy, and livelihood challenges. Large amounts of dry pine needles accumulate on forest floors, significantly increasing the risk of forest fires during dry seasons. At the same time, communities in high-altitude regions face difficulty accessing affordable and reliable fuels like LPG and kerosene for cooking and heating.

The lack of local livelihood opportunities further impacts women and youth, contributing to economic vulnerability. By transforming forest waste into a useful, low-cost fuel alternative, the project addresses fire hazards, energy insecurity, and unemployment simultaneously. The fire starter bricks are smokeless, non-toxic, easy to ignite, and lightweight, making them suitable for household use in remote and cold regions.

The solution involves collecting dry pine needles, cleaning and shredding them, and mixing them with natural or recycled wax. The mixture is moulded into compact bricks, with optional binders added to improve texture and ignition efficiency. These bricks burn cleanly and are easy to handle. Production can be carried out by local self-help groups, women's cooperatives, and unemployed youth, generating income while reducing forest fire risks and promoting sustainable energy use.

(Source: GYS Avishkar Awards 2025 Booklet)

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

Waste Water Recycling

This project focuses on conserving groundwater through effective wastewater recycling. Aligned with the objectives of the Swachh Bharat Abhiyan, the innovation addresses the issue of excessive water usage in high-demand areas such as railways, where large quantities of water are consumed every day. The project emphasises sustainable water management and responsible reuse of available resources.

S. Mary Jyothi
10th Class

The system operates on three key treatment processes: sedimentation, filtration, and sterilisation. Wastewater, including water used in toilets, is first collected and allowed to settle to remove solid particles, then filtered to eliminate finer impurities, and finally sterilised to ensure safety. The treated water is recycled for reuse, thereby reducing freshwater demand and supporting long-term water conservation.

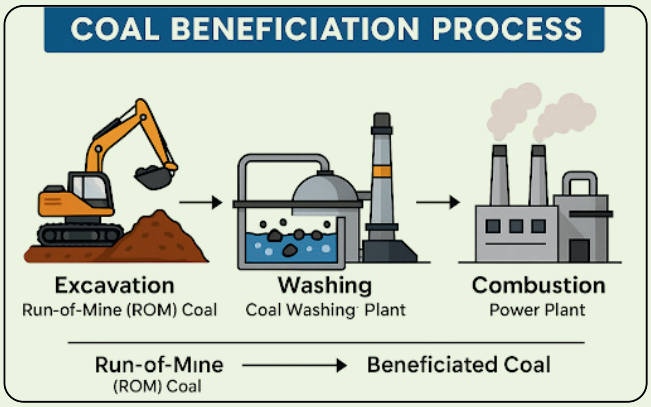
(Source: INSPIRE MANAK NLEPC 2015 Booklet)

Central Institute of Mining and Fuel Research (CIMFR)

Have you ever wondered how coal is mined safely or how scientists work to reduce pollution from mining? Behind these important questions stands the **Central Institute of Mining and Fuel Research (CIMFR),** one of India's leading science institutions working at the heart of the country's energy and mining sector.

CIMFR was established in **1946** and is located in **Dhanbad, Jharkhand,** often called the Coal Capital of India. It functions under the **Council of Scientific and Industrial Research (CSIR).** The institute's main mission is to make **mining safer, cleaner, and more efficient,** while ensuring that fuel resources are used responsibly.

At CIMFR, scientists and engineers act like problem-solvers of the underground world. They study how minerals and coal are extracted from deep inside the Earth and design technologies to prevent accidents such as mine collapses, fires, and gas explosions. Their research helps protect the lives of miners who work in challenging and risky conditions every day.



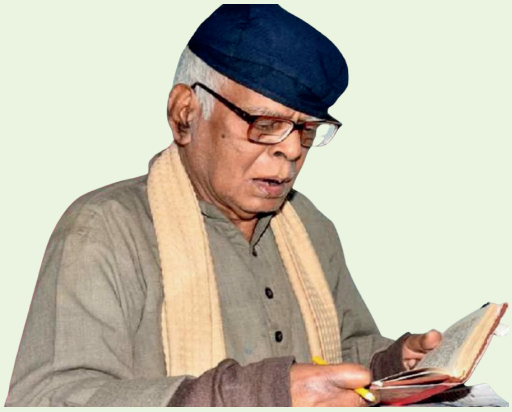
CIMFR also focuses on **fuel research**, especially coal. Scientists work on improving coal quality, reducing harmful emissions, and finding cleaner ways to use fossil fuels. They develop technologies that help industries use energy more efficiently and reduce environmental damage. This is especially important as India balances its energy needs with environmental protection.

Another exciting area of CIMFR's work is the use of advanced technology—such as sensors, robotics, and computer models—to monitor mines and predict dangers before they happen. The institute also studies mine rehabilitation, helping restore land after mining so nature can recover.

For students, CIMFR shows that science can be adventurous, impactful, and meaningful. It brings together physics, chemistry, geology, engineering, and environmental science to solve real-world problems. If you are curious about how things work underground, how energy powers the nation, or how science can save lives, CIMFR proves that learning science can lead to powerful solutions for India's future.

Indian Scientist

Dr. Vashishtha Narayan Singh



(2 April 1942 - 14 November 2019)

Have you ever seen lightning crack across the sky, noticed the glow inside a tube light, or wondered how scientists hope to create artificial suns on Earth? All these are connected by **plasma**, the fourth state of matter and one of the scientists who helped India understand and master it was **Predhiman Krishan Kaw.**

Unlike solids, liquids, and gases, plasma is made of charged particles that behave in surprising and sometimes wild ways. It fills the stars, powers the Sun, and makes auroras dance in the sky. On Earth, plasma is everywhere, too, inside **neon signs, fluorescent lamps, plasma TVs, and even in the tiny sparks inside electronic devices.** Understanding how plasma behaves is not easy, and that is where Kaw's work becomes important.

Predhiman Krishan Kaw was a **theoretical plasma physicist**, which means he studied plasma using ideas, equations, and models to explain what cannot always be seen directly. One of the biggest problems with plasma is that it can suddenly become unstable just like how a calm crowd can turn chaotic.

Kaw's research helped scientists understand **plasma instabilities and turbulence**, knowledge that is essential for controlling plasma in real-life applications.

One exciting application of this research is **nuclear fusion energy**. Fusion is the process that powers the Sun and stars. Scientists are trying to recreate it on Earth to produce clean energy with no air pollution and very little waste. Devices called **tokamaks** use powerful magnetic fields to control extremely hot plasma. Kaw's work helped scientists understand how to keep this plasma stable, bringing us closer to a future where electricity could come from fusion instead of fossil fuels.

Kaw didn't just work in labs—he helped **build India's scientific future**. As the founding director of the **Institute for Plasma Research (IPR)** in Gandhinagar, he created a place where Indian students and scientists could work on world-class research without leaving the country. Because of institutions like IPR, India today contributes to global projects such as ITER, one of the world's largest fusion experiments.

For students, Kaw's story carries an inspiring message: **the science you study in classrooms connects directly to real life**. The physics For students, Kaw's story carries an inspiring message: the science you study in classrooms connects directly to real life. The physics behind sparks, lights, mobile devices, and future clean energy all traces back to ideas explored by scientists like him. Predhiman Krishan Kaw showed that curiosity about how nature works can one day light homes, power cities, and even help save the planet.

S&I Article

Reinventing RECYCLING

New Ideas for Old Problems

Recycling is not a new idea. For decades, we have been told to reduce, reuse, and recycle. Yet landfills continue to grow, oceans are filling with plastic, and valuable materials are being thrown away every day. This raises an important question: if recycling already exists, why is the problem still getting worse? The answer lies not in effort alone, but in innovation.

Recycling today needs reinvention, new thinking for old problems.

The Recycling Problem We Don't See

At first glance, recycling seems simple: collect waste, process it, and turn it into something new. In reality, recycling systems are complex and fragile. Many recyclable items never get recycled because they are:

- Mixed with food waste
- Made of multiple materials
- Poorly sorted at the source
- Too expensive to process

In some cases, recycling can even create more pollution if it is inefficient or poorly designed. This is why innovation is critical not just better behavior, but better systems.

Why Recycling Needs Innovation

Traditional recycling focuses mainly on waste management. Modern recycling must focus on resource recovery. Instead of asking, "How do we throw this away properly?", innovators now ask, "How do we design things so waste never exists?"

This shift in thinking has given rise to new ideas, technologies, and approaches that are transforming recycling around the world.

New Ideas Changing Recycling

Innovation in recycling is happening at multiple levels:

- **Design innovation:** Products are now being designed using fewer materials or a single type of material, making them easier to recycle
- **Material innovation:** Scientists are developing biodegradable plastics and compostable packaging
- **Technology innovation:** Artificial intelligence and sensors are being used to automatically sort waste faster and more accurately
- **Process innovation:** Waste is being converted into energy, construction materials, and even clothing

Recycling is no longer just about bins it is about intelligent design.

Thinking Beyond Plastic

While plastic gets the most attention, other materials also need reinvention:

- **E-waste:** Old phones and computers contain valuable metals that can be recovered
- **Textiles:** Fabric waste can be recycled into insulation or new fibres
- **Organic waste:** Food scraps can become compost, biogas, or soil nutrients

Innovators are discovering that "waste" is often just a resource in the wrong place.

The Role of Science in Recycling

Science plays a key role in reinventing recycling. Chemistry helps break materials down safely. Physics improves sorting and processing. Data science helps cities track waste flows and design smarter systems.

By applying scientific thinking, recycling moves from trial - and - error to evidence - based solutions. This makes systems more efficient, affordable, and scalable.

What Students Can Do: Become Recycling Innovators

Recycling innovation is not limited to scientists or companies. Students can play a powerful role by:

- Observing waste patterns in their school or home
- Identifying materials that are always thrown away
- Designing simple solutions to reduce or reuse them
- Testing ideas and improving them

Even a small improvement like better segregation or creative reuse can make a big difference when scaled.

Changing Mindsets: From Use-and-Throw to Circular Thinking

One of the biggest challenges in recycling is mindset. We live in a "use - and - throw" culture. Innovation asks us to think in circles instead of straight lines.

In a circular system:

- Products are designed to be reused or repaired
- Materials circulate back into production
- Waste is minimized, not managed

This way of thinking requires creativity, responsibility, and long - term vision.

Old Problems, New Responsibility

Recycling alone cannot solve the waste crisis, but reinvented recycling can. When innovation meets environmental responsibility, solutions become smarter and more sustainable.

The future of recycling will be shaped by those who question existing systems, experiment with new ideas, and refuse to accept waste as inevitable.

Final Thought: Innovation Starts with Awareness

Every piece of waste tells a story about design, choices, and systems. When we learn to read that story, we become innovators.

Reinventing recycling is not just about technology. It is about rethinking how we live, consume, and design the world around us. And that reinvention can begin with you.

Riddles 2512

1. I'm the smallest unit, a building block of life. Without me, no plant or animal would thrive. What am I?
2. What speeds up chemical reactions without being used up?
3. Which fundamental particles are the building blocks of matter?
4. I'm always moving, yet I never move. What am I?
5. I'm a type of system, but I'm not man-made. What am I?

(Answers on Back Cover Inside)

Automatic Dim Dip of Car Headlight

Prasanna Shirahatti
9th Class

Driving at night often becomes unsafe when oncoming vehicles use high-beam headlights, causing glare that temporarily blinds drivers and increases the risk of accidents. To address this issue, the student developed an automatic dim-dip headlight system for vehicles. The innovation uses a simple electronic circuit that automatically switches the headlight from high beam to low beam when it detects glare from an approaching vehicle, and restores the high beam once the vehicle passes. This reduces discomfort for drivers and helps prevent night-time collisions.

The project reflects a practical approach to road safety through affordable technology. The student, Prasanna, has a strong interest in innovation, enjoys reading books, and actively participates in various co-curricular activities, which further inspires his problem-solving mindset.

(Source: INSPIRE MANAK NLEPC 2017 Booklet)

Multi - Purpose Heat Exchanger

This project presents a multi-purpose, eco-friendly device that operates entirely on renewable solar energy and is designed to conserve power while serving multiple household needs. A single system functions as a room cooler in summer, a room warmer in winter, a water heater, and a solar cooker. Built using simple materials such as a silver reflector bowl, copper tubes, a transparent spherical container, and PVC pipes, the device is affordable and sustainable.

It works on the principle of the greenhouse effect, where shortwave solar radiation enters the transparent container, converts into long-wave radiation, and gets trapped, raising the internal temperature. This stored heat energy is efficiently reused for different applications, making the device energy-efficient, pollution-free, and easy to install in diverse environments.

Ramandeep Kaur
9th Class

In summer, the rooftop heat exchanger heats air, causing hot air to rise and escape, which pulls cooler air into the room. In winter, the exchanger transfers warm air indoors through insulated pipes. For water heating and purification, solar heat evaporates impure water, which condenses into clean water. As a solar cooker, the exchanger absorbs sunlight from all directions, enabling faster and more efficient cooking.

(Source: INSPIRE MANAK NLEPC 2014 Booklet)

Indian Inventions

Buddhism and Jainism

When we talk about inventions, we usually think of machines, tools, or technology - things we can see and touch. But some of the most powerful inventions in human history were not physical objects. They were **ideas** that changed how people thought, lived, and treated one another.

Ancient India was one of the first civilisations to understand this. Along with mathematics, medicine, and urban planning, India also invented **new ways of living**.

Among the greatest of these were **Buddhism and Jainism** - two philosophies that transformed society without using weapons, machines, or force.

These were not just religions. They were **solutions to social problems**, carefully thought out and tested in real life.

The Problem Ancient India Faced

More than 2,500 years ago, Indian society was highly structured and unequal. A person's birth often decided their profession, status, and even their right to learn. Religious practices had become complicated, expensive, and difficult for common people to understand.

Many people felt lost. They followed rituals without knowing their meaning. Violence—towards animals, enemies, and even within society—was often accepted as normal. People began asking important questions: Is there a simpler way to live a good life? Can humans reduce suffering? Is kindness more powerful than rituals?

India needed new thinking—not new weapons or kings, but **new ideas**. This need gave birth to Buddhism and Jainism.

Jainism: The Radical Invention of Non-Violence

Jainism introduced one of the boldest ideas the world had ever seen: **ahimsa**, or complete non-violence. It taught that every living being, no matter how small, has value and deserves respect.

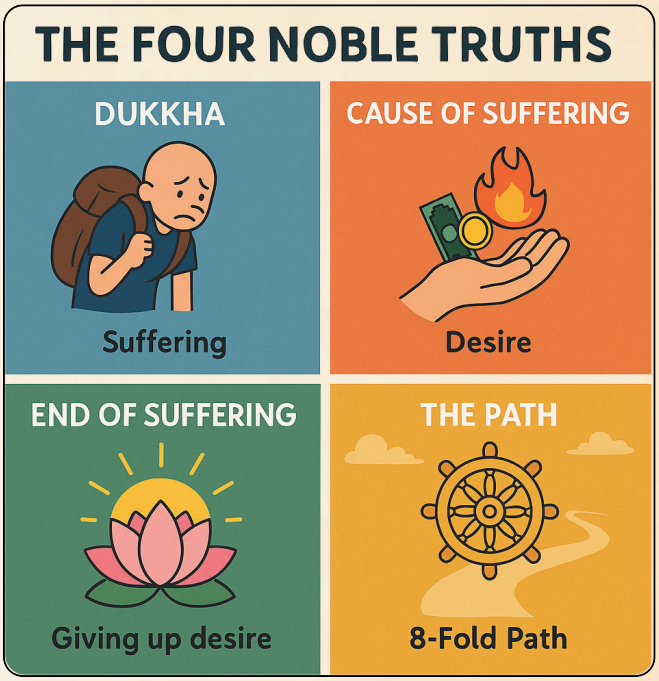
This idea was revolutionary. At a time when power was shown through strength and violence, Jainism argued that true strength comes from **self-control**. Hurting others—through actions, words, or even thoughts—was believed to harm the person who caused it.

Jainism encouraged people to live carefully and responsibly. Followers tried to reduce harm in everyday life, from what they ate to how they earned their living. This led to habits of simplicity, honesty, and discipline.

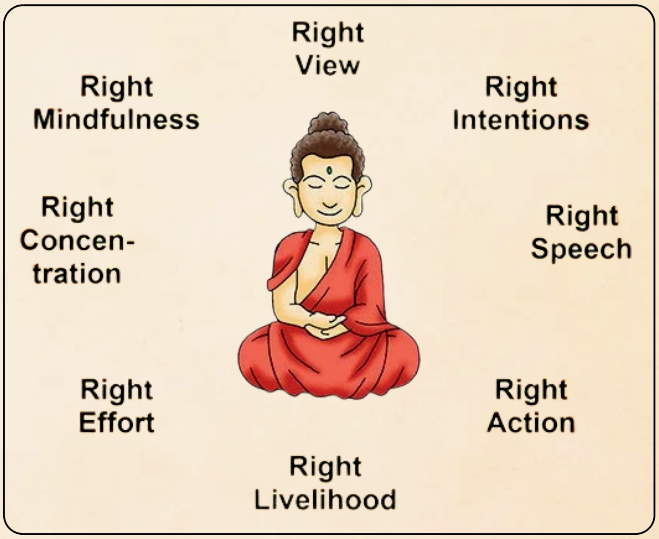
For students today, this way of thinking connects strongly with ideas like environmental protection, animal welfare, and ethical choices. Jainism showed that a peaceful society begins with peaceful individuals.

Buddhism: The Invention of the Middle Path

While Jainism focused on non-violence, Buddhism focused on a different problem: **human suffering**. Instead of asking people to worship gods or perform rituals, Buddhism asked them to **understand themselves**.



The Buddha observed that people suffer because of uncontrolled desires, anger, and confusion. Instead of extreme luxury or extreme self-punishment, he suggested a balanced way of living known as the **Middle Path**.



This approach was practical and logical. Buddhism explained life almost like a step-by-step method: understand the problem, identify its cause, and follow a method to solve it. This made Buddhism easy to understand and follow, even for ordinary people.

Meditation became a key practice. It helped people train their minds, improve focus, and manage emotions. Today, when students struggle with stress, distractions, and pressure, these ancient ideas feel surprisingly modern.

Learning Without Birth or Barriers

One of the most powerful inventions of Buddhism and Jainism was the idea that **knowledge should be accessible to all**. Learning was no longer limited by caste or wealth.

Monasteries became centres of education where students discussed ethics, logic, and philosophy. Teachers encouraged questioning instead of blind belief. This created one of the earliest cultures of open learning in the world.

Because of this openness, Buddhism spread far beyond India—not through war, but through teaching and example. It influenced education systems, art, architecture, and governance across Asia.

India, once again, became a **teacher to the world**.

Innovation Without Tools, Power Without Weapons

What makes Buddhism and Jainism truly special is that they did not depend on technology or force. They relied entirely on **ideas and personal practice**.

These philosophies changed:

- How people treated animals
- How rulers thought about justice
- How individuals understand happiness

They proved that societies can be transformed not only by the inventions we build, but by the values we follow.

Even today, ideas like peace, mindfulness, sustainability, and ethical living reflect the influence of these ancient Indian inventions.

Why These Ideas Matter to Students Today

For students in today's fast-paced world, Buddhism and Jainism offer timeless lessons. They teach patience in failure, balance in success, and kindness in competition. They remind us that success is not only about winning, but about **how we live and grow**.

These philosophies encourage students to think, reflect, and make responsible choices – skills that are just as important as academic knowledge.

Conclusion: When India Invented Ways of Living

Buddhism and Jainism prove that India's greatest inventions were not always machines or monuments. Some were ideas that shaped minds and societies for thousands of years.

They remind us that long before modern science, India was inventing solutions to human problems – solutions that still guide the world today.

India did not just invent things.

India invented wisdom.

Central Electro Chemical Research Institute (CECRI)

Central Electrochemical Research Institute (CECRI) is one of India's most important scientific research institutes. It is located in Karaikudi, a town in Tamil Nadu, and was established in the year 1953. CECRI works under the Council of Scientific and Industrial Research (CSIR), a national organisation that supports scientific research across the country. The main focus of CECRI is a branch of science called **electrochemistry.**

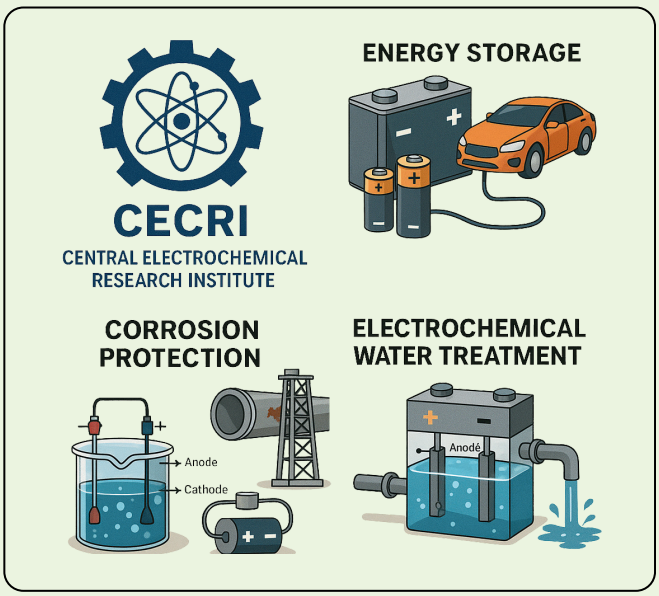
Electrochemistry is the study of how electricity and chemical reactions are connected. Though the word may sound complex, electrochemistry is part of many things we use in our daily lives. For example, batteries in mobile phones and laptops, electric vehicles, water purifiers, and even the process that causes iron to rust are all related to electrochemistry. Scientists at CECRI study these processes carefully so that they can improve existing technologies and invent new ones that are useful for society.

One of the key areas of research at CECRI is **battery technology.** With the growing use of smartphones, electric vehicles, and renewable energy sources like solar and wind power, the demand for better batteries is increasing. CECRI scientists work on developing batteries that are safer, charge faster, and last longer. These efforts support India's goal of using clean and sustainable energy in the future.

Another important area of work at CECRI is **corrosion prevention.** Corrosion, or rusting, slowly damages metals and causes huge losses to industries every year. CECRI develops methods to protect metals used in bridges, ships, pipelines, railway tracks, and buildings. By preventing corrosion, the institute helps increase safety and save money and resources.

CECRI also plays a strong role in **environmental protection.** The institute develops electrochemical methods to clean polluted water and treat industrial waste. These technologies help remove harmful chemicals from water, making it safer for people, animals, and plants. Such research is very important in a country like India, where clean water is a precious resource.

In simple terms, CECRI is a place where curiosity meets practical problem-solving. It shows students that science is not just about textbooks and exams, but about observing the world, asking questions, and finding solutions that improve people's lives. By nurturing innovation and scientific thinking, the Central Electrochemical Research Institute continues to inspire young minds and contribute to a better, cleaner, and more sustainable future for India.




Innovation Training Module
From
IDEA
to
IMPACT
Turning Concepts into Reality
INNOVATE • DEVELOP • PLAN • ACHIEVE

How to Turn Your Idea into Real - World Change

Everyone has ideas.

You may have thought:

- "Why can't school bags be lighter?"
- "Why is so much food wasted in the canteen?"
- "Why does traffic near our school get so chaotic?"

Ideas are powerful, but here is the truth.

An idea alone changes nothing. Impact begins when you act.

This module will teach you how to turn your thoughts into meaningful change.

The Myth of the "Brilliant Idea"

Many people believe innovation is about having one big, genius idea.

But in reality:

- Ideas are common.
- Execution is rare.
- Persistence creates impact.

Think about it - how many times have you had a good idea but never acted on it?

The difference between dreamers and innovators is not intelligence.
It is an action.

Step 1: Clarify the Real Problem

Before jumping into solutions, ask:

- What exactly is the problem?
- Who is affected?
- Why does it matter?

For example

Instead of saying, "Students wastewater."

Clarify it: "Water taps in school are left open during lunch break, causing 200 - 300 liters of wastage daily."

The clearer the problem, the stronger your solution.

Step 2: Validate the Need

Sometimes we assume something is a problem - but is it really?

Talk to people.

- Ask classmates.
- Ask teachers.
- Observe carefully.
- Collect small data.

For example:
If you want to reduce food waste in the canteen, measure how much food is thrown away daily.

Innovation should be based on reality, not assumptions.

Step 3: Build a Simple Prototype (Start Small!)

You don't need a perfect product..

You need a Minimum Viable Product (MVP) - the smallest version of your idea that still works.

You need a **Minimum Viable Product (MVP)** - the smallest version of your idea that still works.

Examples

- A cardboard model of a smart dustbin.
- A simple mobile app wireframe on paper.
- A pilot compost pit is in one corner of the school.
- A basic survey - based traffic management plan.

Do not aim for perfection. Aim for learning.

Step 4: Test in the Real World

This is where real innovation begins. Take your prototype and test it.

Ask

- Does it actually work?
- What problems appear?
- What feedback do users give?

For example you create a compost system.

After two weeks:

- Does it smell?
- Is it being maintained?
- Are students using it correctly?

Testing may show flaws - and that is good. Every flaw is feedback.

Step 5: Improve, Repeat, Refine

Impact does not come in one attempt.

It comes from cycles:

Build → Test → Improve → Repeat

Maybe:

- Your dustbin needs clearer instructions.
- Your app needs a simpler design.
- Your awareness campaign needs better communication.

Each version becomes stronger.

Innovation is a process, not an event.

Step 6: Think About Scale

If your solution works in one classroom, ask:

- Can it work in the whole school?
- Can it work in other schools?
- What changes are needed for larger use?

Scaling requires thinking beyond the prototype.

For example: If your compost model works in one school:

- How much space is needed?
- What budget is required?
- Who will manage it?

Impact grows when solutions expand responsibly.

Step 7: Build a Team

Big impact is rarely created alone.

You need:

- Friends, Teachers, Mentors, Volunteers

Each person brings:

- New ideas, Different skills, Energy

Leadership is part of innovation. Learning to collaborate multiplies your impact.

Step 8: Manage Resources Wisely

Even school - level projects require:

- Time, Materials, Small budgets, Permissions

Learn to:

- Plan your expenses
- Use recycled materials
- Ask for support respectfully
- Present your idea clearly

These are entrepreneurial skills - and they are powerful.

Step 9: Measure Your Impact

Many projects look good - but do they really work?

Ask

- How many people used it?
- What changed because of it?
- Did the problem reduce?

For example

Before the compost project: 10 kg of food waste daily.

After the compost project: 3 kg of waste daily.

That is a measurable impact. it's Outputs are activities and Impact changes.

Learn to measure change.

Step 10: Tell Your Story

If nobody knows about your solution, it cannot spread.

Learn to

- Present clearly.
- Use simple slides.
- Explain the problem and solution logically.
- Share results honestly.

Storytelling helps ideas travel. And ideas that travel create a wider impact.

Real Example: From School Problem to Real Change

Imagine this journey:

Problem: Plastic bottles litter the school campus.

Step 1: Observe and measure litter areas.

Step 2: Interview students about usage habits.

Step 3: Introduce a refill water station prototype.

Step 4: Track plastic bottle usage for one month.

Step 5: Reduce bottle waste by 40%.

Step 6: Present findings to school management.

Step 7: Expand refill stations.

That is the idea to impact. Not just a model - but measurable change.

Common Mistakes to Avoid

1. Waiting for perfect conditions.
2. Trying to solve everything at once.
3. Ignoring feedback.
4. Giving up after the first failure.
5. Focusing only on competitions, not real - world use.

Remember that Failure is not the opposite of impact. It is part of the journey toward impact.

The Mindset Shift

Instead of asking: "Is this idea cool?"

Ask - "Does this idea solve something meaningful?"

Instead of saying: "I built a model." **Say** - "I reduced water wastage by 20%."

That is impact thinking.

Activity: Your Idea-to-Impact Plan

Take one idea you currently have and write:

- What is the exact problem?
- Who is affected?
- What small prototype can I build in 7 days?
- How will I test it?
- How will I measure change?

This simple exercise can turn imagination into action.

The World Needs Doers

Many people talk about change. Few people create change.

You do not need to be:

- Very rich, Extremely famous, Highly experienced

You need:

- Clarity, Courage, Consistency

Impact is not about size. Even improving one classroom matters. Small change builds confidence. Confidence builds a larger impact.

Final Thought

An idea is a spark. Action is fuel. Persistence is fire.

When you combine all three, You don't just think differently - You change reality.

As a young innovator, remember:

Your ideas matter. But your actions matter more.

The journey from idea to impact begins the moment you decide to start. 🚀

Remote Controlled Robotic Wheelchair

This project focuses on creating a smart robotic wheelchair to assist people with physical disabilities in moving independently. The wheelchair is controlled using a standard TV remote, making the system simple, familiar, and easy to use. By adapting everyday technology for assistive purposes, the project highlights how innovation can improve accessibility and quality of life.

Sri Krishna Beria
9th Class

The wheelchair works on the principle of infrared (IR) signal decoding. Commands from the TV remote are received by an IR sensor, converted into binary signals, and processed by a microcontroller. Based on programmed instructions, the microcontroller controls DC motors via a motor driver to enable movement in all directions. The system uses a robotic chassis, DC motors and wheels, a microcontroller, an IR sensor circuit, a battery, a motor driver, and connecting wires.

(Source: INSPIRE MANAK NLEPC 2013 Booklet)

Scorpion Robot

The Scorpion Robot is a simple robotic model designed to pick up and move light objects from one place to another, mimicking basic human handling tasks. It operates on a 12-volt power supply and demonstrates how mechanical movement can be achieved using simple components. The robot is built using a wooden frame and waste materials from watches, highlighting the reuse of discarded parts for functional innovation.

Although the current model can only lift small and lightweight objects, it effectively showcases the concept of object handling through robotic arms. The project took around 20 days to build and reflects careful experimentation and learning through hands-on construction.

Sarfaj Ansari
8th Class

The robot has potential for further development and improvement. In the future, it can be scaled up to carry heavier loads by using stronger materials and improved mechanisms. There is also scope to integrate solar energy to make it more sustainable. With further refinement, the Scorpion Robot could be used in places like plants or workshops to save time, reduce manual effort, and improve work efficiency.

(Source: INSPIRE MANAK NLEPC 2015 Booklet)

Indian Inventions

A World Before Toilets

Imagine living in a city without toilets, drains, or waste disposal systems. In many ancient societies, waste was thrown onto streets or left in open areas, leading to disease and poor living conditions. Cleanliness was a major challenge, and cities often became unhealthy places to live. Surprisingly, thousands of years ago, India solved this problem in a way that was far ahead of its time.

Long before modern plumbing and bathrooms existed, people in ancient India designed one of the world's earliest known flush toilet and sanitation systems. This invention was not just about comfort - it was about health, hygiene, and intelligent city planning.

The Indus Valley's Revolutionary Sanitation System

Around 2600 BCE, during the Indus Valley Civilisation, cities such as Mohenjo-daro and Harappa showed an extraordinary understanding of sanitation. Archaeologists have discovered houses with private toilets connected to covered drains. These toilets used water to carry waste away—an early form of the flush toilet.

Each home was connected to a well-planned underground drainage network made of baked bricks. Wastewater flowed through sloped, covered drains into larger channels outside the city.

Inspection holes were built at regular intervals, allowing the drains to be cleaned—something even many modern cities struggle with. This shows that sanitation was not an afterthought but a core part of urban design.

How the Ancient Flush Toilet Worked

The toilets in Indus Valley homes were usually small rooms with a sloped floor.

Water was poured into the toilet to flush waste into vertical terracotta or brick pipes. These pipes led to underground drains that safely carried waste away from living areas. In some cases, soak pits were used to collect solid waste, preventing blockages and contamination.

What makes this system remarkable is that it was used not only in palaces or elite homes, but in ordinary houses as well. This suggests that cleanliness and hygiene were considered important for everyone, not just the wealthy. It reflects a strong civic sense and respect for public health.

India: Centuries Ahead of the World

While ancient India had flush toilets and covered drains, many other civilisations relied on open drains or had no sanitation systems at all. Even in Europe, proper sewer systems became common only in the 19th century. This means India was nearly 4,000 years ahead in understanding urban sanitation.

This advanced system helped Indus Valley cities remain clean, organised, and healthy. Fewer diseases, better water management, and improved quality of life made these cities some of the most livable places in the ancient world. Sanitation was a key reason why these cities were able to support large populations.

Loss and Rediscovery of an Ancient Genius

Over time, as civilisations declined and cities disappeared, this knowledge of sanitation was lost. Later societies did not always maintain such high standards of cleanliness. For centuries, people across the world lived without proper toilets, leading to repeated outbreaks of disease.

It was only in modern times, through archaeological discoveries, that the brilliance of India's ancient sanitation systems was fully recognised. Historians and engineers today study the Indus Valley drainage as an example of sustainable and people-focused urban planning.

Flush Toilets in the Modern World

Today, flush toilets are considered a basic necessity. They protect human dignity, prevent disease, and improve quality of life. Modern toilets use advanced plumbing, water seals, and sewage treatment plants, but the basic idea remains the same as in ancient India—using water to safely remove waste from living spaces.

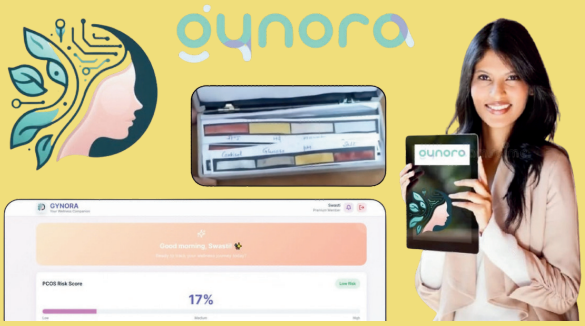
However, modern sanitation also brings challenges. Flush toilets use large amounts of water, and many parts of the world still lack access to safe sanitation. Poor waste management continues to cause health and environmental problems, especially in rapidly growing cities.

India's Sanitation Story Today

In present-day India, sanitation has once again become a national priority. Large-scale efforts are being made to ensure access to toilets, improve sewage systems, and promote hygiene. The goal is not just to build toilets, but to create cleaner, healthier communities.

GYNORA

Gynora is an AI - powered hormonal health platform designed to enable early detection and management of Polycystic Ovary Syndrome (PCOS) among young women. PCOS often presents symptoms such as irregular menstrual cycles, acne, fatigue, and weight fluctuations, yet it frequently goes undiagnosed due to low awareness, delayed medical consultations, and limited access to affordable clinical testing.



Late diagnosis can worsen long - term reproductive and metabolic health. Gynora addresses this gap by combining digital health tools with at home testing to make hormonal screening accessible and preventive. The platform empowers users to understand their hormonal health early through personalised insights, risk assessment, and continuous guidance, reducing dependence on costly clinical visits.

Swasti Sharma
11th Class

Gynora integrates a mobile application with a 4 - in - 1 home testing kit that analyses sweat or saliva for cortisol, glucose, salt, and pH levels. The app also uses facial scan analysis and symptom tracking to gather additional indicators. Users enter test results into the app, which combines all data to calculate a dynamic PCOS risk score. An AI-driven coach then provides personalised diet, fitness, lifestyle guidance, reminders, and downloadable health reports for informed decision-making.

(Source: GYS Avishkar Awards 2025 Booklet)

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

Clothes Drying Circular Hanger

Frequent rainfall, high humidity, and limited sunlight make drying clothes difficult, especially during the rainy season. Faced with this problem, Tengrimbirth developed a simple and effective clothes-drying device that allows clothes to dry quickly and easily indoors. The system is assembled using basic components such as a motor, switch, blower, metal rings for hanging clothes, metal pipes, and other supporting parts.

Tengrimbirth R. Sangma
10th Class

A battery-powered heater generates warm air, which is circulated evenly by the blower around the clothes, speeding up the drying process. The device is lightweight, portable, and cost-effective, making it suitable for everyday household use. In a country like India, where humid and rainy conditions are common, this innovation offers a practical solution for efficient clothes drying without dependence on sunlight.

(Source: INSPIRE MANAK NLEPC 2021 Booklet)

Central Institute of Medicinal and Aromatic Plants (CIMAP)

Have you ever smelled mint, applied aloe vera gel, or heard your grandparents talk about herbal medicines? What if we told you that there is a place in India where scientists work every day to unlock the secrets of such plants? That place is the **Central Institute of Medicinal and Aromatic Plants (CIMAP)**.

CIMFR - Building and Products

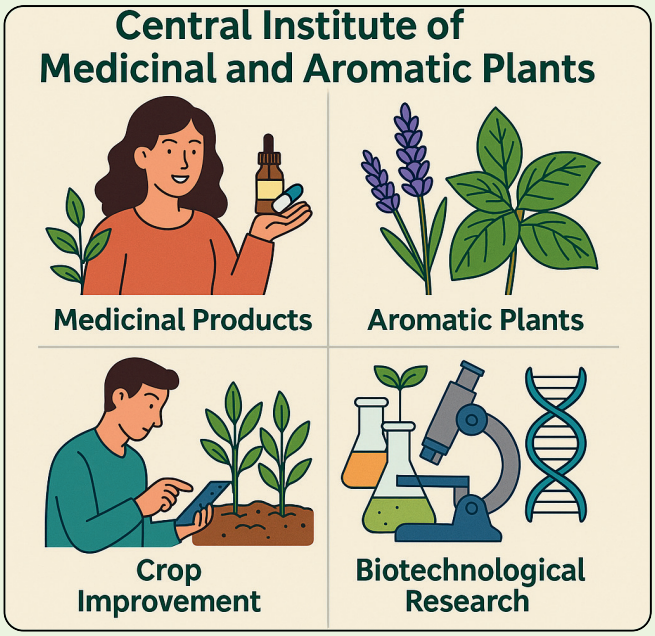
CIMAP was established in **1959** and is located in **Lucknow, Uttar Pradesh.** It works under the **Council of Scientific and Industrial Research (CSIR),** one of India's top scientific bodies. The main goal of CIMAP is to research **medicinal plants** (plants that help cure diseases) and **aromatic plants** (plants that give pleasant fragrances and essential oils).

At CIMAP, scientists are like nature explorers. They study how plants grow, what useful chemicals they contain, and how these chemicals can be used in medicines, cosmetics, perfumes, and health products. By using modern sciences such as biology, chemistry, and biotechnology, CIMAP develops improved plant varieties that grow faster, yield higher yields, and are more resistant to pests and diseases.

Some famous plants improved by CIMAP include **mint (mentha), tulsi, ashwagandha, aloe vera, lemongrass, and vetiver.** Today, farmers across India grow these plants using CIMAP's methods. This helps farmers earn more money and provides raw materials for herbal medicines and wellness products used in India and abroad. In this way, CIMAP connects science directly to people's lives.

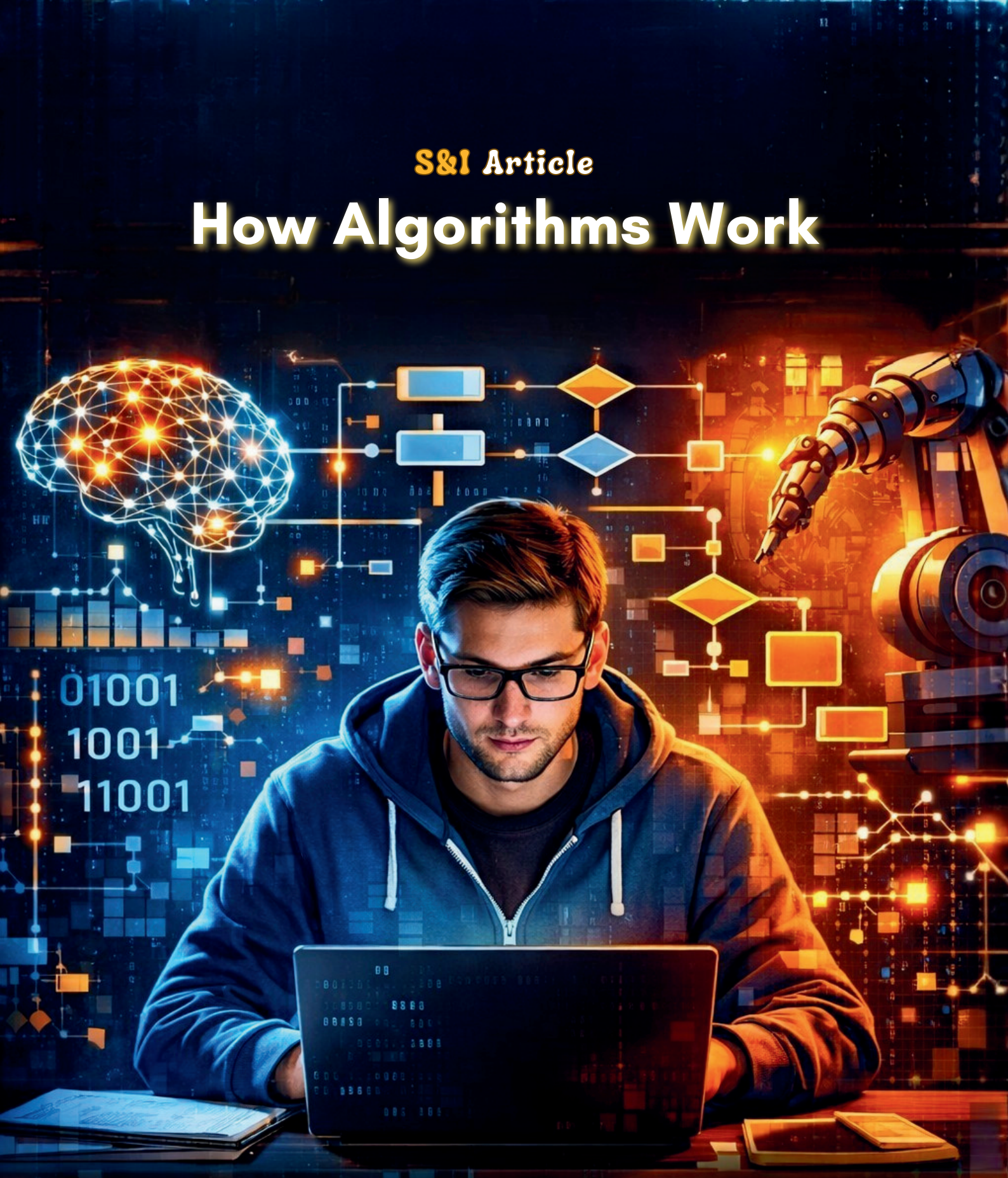
CIMAP also plays an important role in protecting **traditional knowledge**, such as Ayurveda, while testing it scientifically to make it safer and more reliable. The institute works closely with industries to turn laboratory research into real products we use every day.

For students, CIMAP is inspiring because it shows that science is not just about textbooks and exams; it is about solving real world problems. It teaches us that plants are powerful, science is creative, and research can help both people and the planet.



S&I Article

How Algorithms Work



INSIDE MACHINE LEARNING | THE POWER OF DATA | AI & THE FUTURE

Every time you search for a video, unlock your phone, follow a recipe, or decide the fastest route home, you are using an algorithm whether you realize it or not. Algorithms are not just lines of code inside computers; they are clear, logical steps used to solve problems. Learning how algorithms work can change the way you think, helping you approach challenges with clarity, precision, and creativity.

To think like a computer scientist is not to think like a machine but to think systematically.

What Is an Algorithm?

An algorithm is a step-by-step method for solving a problem or completing a task. It must be:

- Clear and unambiguous
- Ordered in a logical sequence
- Designed to reach a solution efficiently

For example, brushing your teeth follows an algorithm: pick up the toothbrush, apply toothpaste, brush for a certain time, rinse, and finish. If the steps are unclear or out of order, the result fails. Computers work the same way except they follow instructions exactly as given.

Why Algorithms Matter

Algorithms are the invisible engines behind modern life. They:

- Decide what content you see online
- Help doctors analyse medical data
- Power navigation apps and recommendation systems
- Manage traffic, banking, and communication

But beyond technology, algorithms matter because they teach us how to think clearly. They force us to break big problems into smaller, manageable steps—an essential life skill.

Thinking Like a Computer Scientist

Computer scientists approach problems differently. Instead of jumping to solutions, they focus on structure. Their thinking usually involves:

- Understanding the problem fully
- Breaking it into smaller parts
- Identifying patterns
- Designing step-by-step solutions
- Testing and improving the process

This approach is called algorithmic thinking, and it can be applied far beyond computers—to studies, sports strategies, planning events, or even resolving conflicts.

Breaking Problems into Steps

One key idea behind algorithms is decomposition breaking a complex problem into simpler tasks. Imagine organizing a school event. Instead of seeing it as one huge challenge, you divide it into steps: choosing a date, booking a space, inviting participants, arranging materials, and managing time.

Computers cannot handle vague instructions like “do it nicely.” They need precise steps. Learning to think this way improves clarity and reduces confusion even for humans.

Efficiency: Doing Things the Smart Way

Not all algorithms are equal. Some solve problems faster and with fewer resources. Computer scientists care deeply about efficiency.

For example, if you are searching for a name in a list:

- Checking every name one by one works, but is slow
- Sorting the list and narrowing down the search is much faster

This idea teaches an important lesson: how you solve a problem can be as important as solving it at all.

Algorithms and Decision-Making

Algorithms are not just about numbers—they are about decisions. When a computer chooses the shortest route or the best recommendation, it is following rules to compare options and select the best outcome.

As students, you already use decision algorithms:

- Choosing the best study method
- Prioritizing homework
- Managing time before exams

By making your decision-making steps clearer, you reduce stress and improve results.

Testing, Errors, and Improvement

No algorithm is perfect on the first try. Computer scientists expect errors. When something doesn't work, they:

- Identify where the logic failed
- Adjust the steps
- Test again

This process teaches an important mindset: mistakes are part of problem-solving, not a sign of failure. Each error improves the algorithm and the thinker behind it.

Algorithms Without Computers

You don't need a laptop to learn algorithms. Try these:

- Write steps to solve a math problem
- Create a rule-based game
- Design instructions for a robot made of paper
- Explain a daily task so clearly that anyone could follow it

These activities train your brain to think logically, precisely, and creatively.

Why Learning Algorithms Empowers You

Understanding algorithms gives you more than technical skills. It helps you:

- Think clearly under pressure
- Communicate ideas better
- Solve complex problems confidently
- Understand how digital systems affect your life

In a world increasingly shaped by technology, algorithmic thinking is becoming as important as reading and writing.

Final Thought: You Already Think in Algorithms

You don't need to be a programmer to think like a computer scientist. Every time you plan, organize, or solve a problem step by step, you are using algorithms.

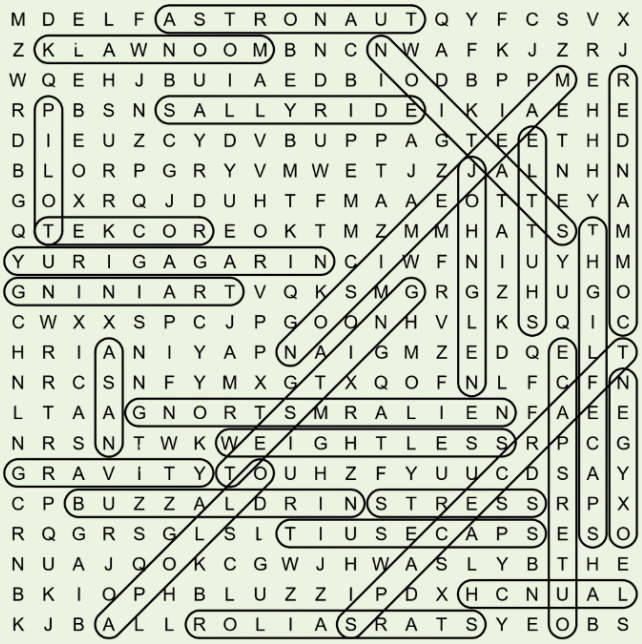
The real power lies in becoming aware of how you think and improving it.

Because learning how algorithms work isn't just about computers.
It's about learning how you work.

Solution
Sudoku Challenge 2512

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

Solution
Word Search 2512



Riddle 2512 Answer

1. A Cell 2. Catalyst 3. Atoms 4. A Shadow 5. Ecosystem

GYS SWAMINATHAN SCIENCE DAY CONTESTS

A National Online Competition for 28 Feb 2026

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SCIENCE DAY CONTESTS 2026
Competitions for 28 Feb 2026

GETA YOUNG SCIENTIST PROGRAM

Skits Contest

6th to 12th Students

Theme: An Indian Invention, an Indian Scientist, or a Science & Technology Concept

Submissions Open

YoungScientistIndia.org

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GETA YOUNG SCIENTIST PROGRAM

Poster Presentation

Theme:
An Indian Invention, an Indian Scientist,
or a Science & Technology Concept

6th to 12th Students

Submissions Open

Register @ YoungScientistIndia.org

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SCIENCE DAY CONTESTS 2026
Competitions for 28 Feb 2026

GETA YOUNG SCIENTIST PROGRAM

Shorts/Reels Contest

Submissions open

Theme: An Indian Invention, an Indian Scientist, or a Science & Technology Concept

6th to 12th Students

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SCIENCE DAY CONTESTS 2026
Competitions for 28 Feb 2026

GETA YOUNG SCIENTIST PROGRAM

PHOTOGRAPHY CONTEST

6th to 12th Students

Submissions Open

Theme: A Science & Technology Concept

YoungScientistIndia.org