

Young Scientist India

A Science & Innovation Magazine for Curious Teachers

Ideas Born in Classrooms



Asima Chatterjee

Yellapragada Subbarao

Anil Kakodkar

R. Venkatesan

Samudrayaan

Advanced Medium Combat Aircraft

The Classroom Inventor

Curiosity Creates Innovation

Young Scientist India

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From the Editor's Desk

Welcome, Young Innovators!

Greetings to our bright, curious, and ever-questioning readers. It brings me great pleasure to present another exciting edition of Young Scientist India, thoughtfully curated to inspire creativity, nurture innovation, and encourage scientific thinking.

Our Cover Story, **Ideas Born in Classrooms**, reminds us that innovation often begins in the most familiar places. Classrooms are not just spaces for learning—they are places where ideas take shape, questions spark curiosity, and young minds imagine solutions to real-world challenges. Every great invention starts with a simple thought, and every student has the potential to become an innovator.

This spirit of innovation continues in our **Innovation Training Modules**. **The Classroom Inventor: How Great Ideas Begin in School** explores how observation, creativity, and experimentation can transform everyday experiences into meaningful solutions. **Curiosity Creates Innovation: Why Questions Matter More Than Answers** highlights the importance of asking thoughtful questions and embracing a mindset of exploration. Together, these modules encourage you to view curiosity as the starting point of discovery.

Technology is all around us, often working silently in the background. In **Behind the Screen: The 25 Innovations Hidden Inside Your Smartphone**, you will uncover the remarkable technologies that power one of the most widely used devices in our lives. Meanwhile, **Eco-Friendly Living** encourages us to think about how small choices can contribute to a more sustainable future.

This edition also celebrates India's scientific excellence through inspiring profiles of **Asima Chatterjee**, **Yellapragada Subbarao**, **Anil Kakodkar**, and **R. Venkatesan**. We also explore pioneering national achievements such as **Samudrayaan** and the **Advanced Medium Combat Aircraft (AMCA)**, showcasing India's growing capabilities in science and technology.

Through student innovations, fascinating knowledge-base projects, and stories from leading research institutions, this issue demonstrates that innovation is driven by curiosity, creativity, and the courage to try.

I hope this edition inspires you to ask questions, think differently, and turn your ideas into action.

Stay curious. Keep exploring. The future is yours to create.



Vennela Valiveti, B. Des.
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S&I Article

Behind the Screen

A Small Device, A Giant Revolution

Take a moment and look at your smartphone. It fits in your hand, slips into your pocket, and travels everywhere with you from classrooms to playgrounds, from villages to metros.

But have you ever wondered what makes this tiny device so powerful?

A smartphone is not just a phone. It is a camera, a GPS navigator, a mini computer, a gaming console, a health tracker, and even a classroom! Behind its smooth glass screen lies a world of science, engineering and innovation built by thousands of scientists and engineers over decades.

From Indian farmers checking weather updates to students attending online classes in remote villages, smartphones are transforming lives across India.

Let us explore **25 amazing innovations hidden inside your smartphone**, explained in a simple and interesting way so that you don't just use technology, but start to understand and innovate it.

1. Touchscreen Technology – The Magic of Your Fingers

When you tap your phone, how does it understand your touch?

Most smartphones use **capacitive touchscreens**, which detect the electrical charge from your fingers. When you touch the screen, it changes the electric field, and the phone identifies the exact location.

2. Microprocessor – The Brain of the Smartphone

The **microprocessor (CPU)** is like the brain of your phone. It performs calculations, runs apps, and manages tasks. Modern smartphones use **System on Chip (SoC)** which combines CPU, GPU, memory, and more into one chip.

3. Operating System – The Manager

The operating system controls everything in your phone.

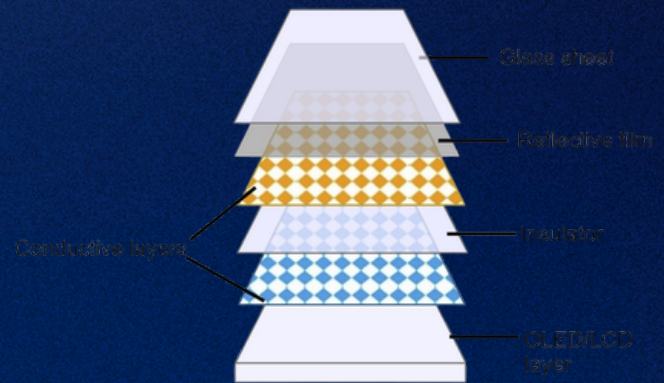
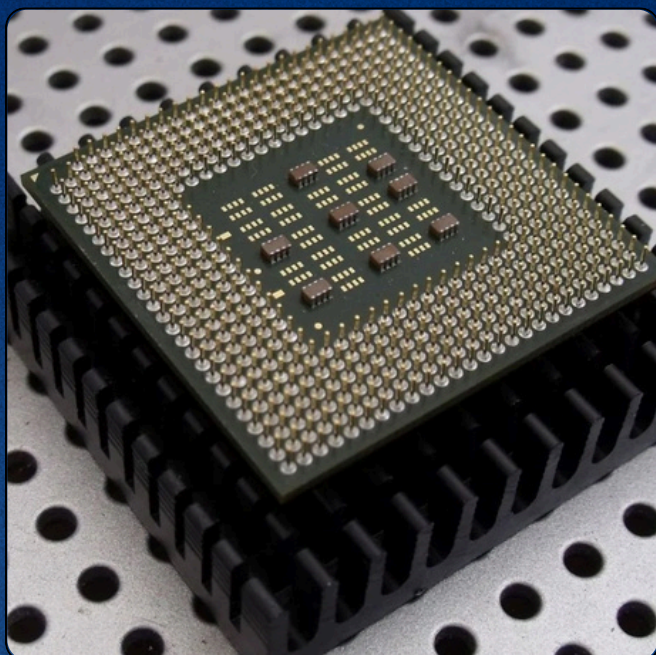
- Android – used in most Indian smartphones
- iOS – used in iPhones

It ensures apps run smoothly and safely.

4. Sensors – Your Phone’s Senses

Your phone can “feel” and “understand” movement using sensors:

- Accelerometer → detects motion



- Gyroscope → detects rotation
- Proximity sensor → turns screen off during calls

DIY Activity : Sensor Experiment

- Open your phone’s sensor app
- Test accelerometer and gyroscope
- Observe how values change with movement

5. Camera Technology – A Pocket DSLR

Smartphones today use:

- Multiple lenses
- AI image processing
- Night mode

6. Artificial Intelligence (AI) – The Smart Assistant

AI helps your phone:

- Recognize faces
- Suggest replies
- Improve photos

Apps like Google Assistant make smartphones smarter every day.

7. Battery Technology – Power in Your Pocket

Lithium-ion batteries store energy efficiently and recharge quickly.

Challenge for innovators: Can you create a battery that lasts 1 week?

8. Fast Charging – Speed Matters

Technologies like fast charging allow phones to charge in minutes.

DIY Activity: Battery Experiment

- Track battery usage over a day
- Identify which apps consume more power

9. Internet Connectivity – The Digital Lifeline

Smartphones connect using:

- 4G / 5G networks
- Wi-Fi

10. GPS – Never Get Lost

GPS uses satellites to find your location.

Apps like Google Maps help Indian delivery workers, drivers and travellers daily.

11. Bluetooth – Wireless Magic

Connect your phone to:

- Earbuds
- Speakers
- Smartwatches

No wires needed!

12. Biometric Security – Your Body as Password

Includes:

- Fingerprint sensor
- Face unlock

Used in apps like PhonePe for secure payments.

13. Cloud Computing – Storage Beyond Your Phone

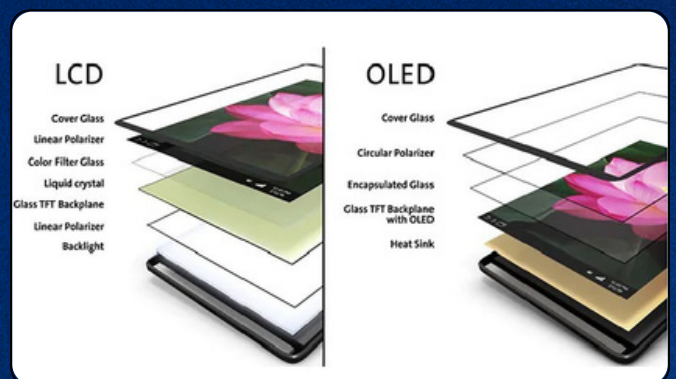
Data is stored online, not just on your device.

Examples:

- Google Drive
- iCloud

14. Display Technology – Crystal Clear Visuals

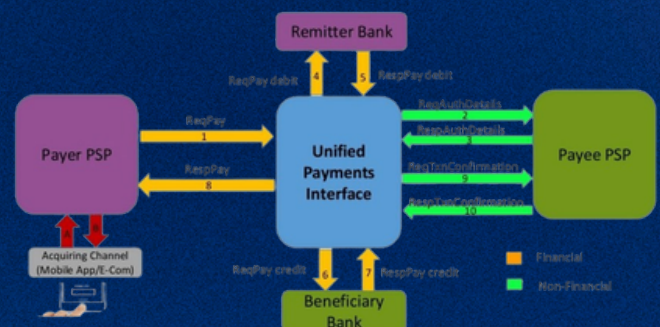
Modern phones use:



- OLED / AMOLED screens
- High refresh rates

15. Mobile Payments

Using UPI, you can pay instantly.



Apps:

- Google Pay
- Paytm

Even street vendors in India now accept digital payments!

16. Augmented Reality (AR) – Mixing Real and Virtual

AR overlays digital objects on real-world scenes.

Used in games, education, and shopping.

17. Voice Recognition – Talk to Your Phone

Your phone understands voice commands.

Example: Asking weather updates or setting alarms.

18. Data Compression – Saving Space and Data

Videos, photos, and apps are compressed to:

- Save storage
- Reduce internet usage

19. Security Encryption – Protecting Your Data

Your messages and transactions are encrypted.

This keeps your data safe from hackers.

20. App Ecosystem – A World Inside Your Phone

Millions of apps available on:

- Google Play Store
- App Store

21. Gaming Technology – Console in Your Pocket

Mobile gaming uses:

- Graphics processing
- Motion sensors

India has a huge mobile gaming audience today!

22. Health Monitoring – Your Digital Doctor

Tracks:

- Steps
- Sleep
- Heart rate

23. NFC Technology – Tap and Pay

Near Field Communication allows:

- Contactless payments
- Cardless transactions

24. Recycling and Sustainability Innovations

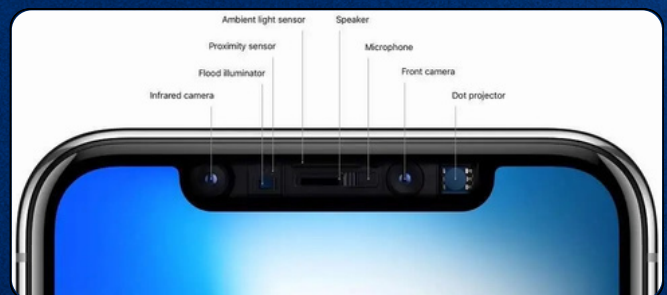
Smartphone companies are working on:

- Recycling materials
- Reducing e-waste

A big opportunity for Indian innovators!

25. Ambient Light Sensor

Adjusts brightness automatically.



Conclusion:

Your smartphone is not just a device; it is a **collection of scientific breakthroughs.**

Ask yourself:

- Can I design a better app?
- Can I improve battery life?
- Can I create a new sensor?

The next big invention may come from students like you.

Indian Scientist

Asima Chatterjee

Padma Bhushan (1975)



(23 Sept 1917 - 22 Nov 2006)

Dr. Asima Chatterjee was a groundbreaking Indian scientist recognized for her work in **organic chemistry and medicinal plants**. She advanced treatments for **epilepsy and malaria**, inspiring many young girls to pursue science.

Early Life and Education

Dr. Asima Chatterjee was born in Kolkata and developed an early interest in medicinal plants. She studied chemistry at Scottish Church College, University of Calcutta, and in 1944 became the first Indian woman to earn a Doctorate of Science (D.Sc.), a notable achievement in her time.

Scientific Contributions

Dr. Asima Chatterjee made significant contributions to organic chemistry and medicinal plant research.

1. Anti - Epileptic Drugs

She developed plant-based anti-epileptic medicines, including Ayush-56 for epilepsy treatment.

2. Anti-Malarial Research

She studied anti - malarial compounds from Indian plants to fight malaria.

3. Cancer Research

Dr. Chatterjee studied vinca alkaloids for chemotherapy, advocating for natural products in cancer treatment.

4. Medicinal Plants of India

She authored 400+ research papers and books, connecting Ayurveda with modern science.

Achievements and Awards

Dr. Asima Chatterjee was awarded several prestigious honors, including the Shanti Swarup Bhatnagar Prize (1961) as the first woman in Chemical Sciences, the Padma Bhushan (1975), the C. V. Raman Award, the P. C. Ray Award, and she was a Fellow of the Indian National Science Academy.

Legacy and Impact

Dr. Asima Chatterjee was a pioneering Indian scientist who linked Ayurvedic knowledge with modern science. Despite financial challenges, she achieved national recognition, including a tribute in the Rajya Sabha and a Google Doodle. She inspires young scientists, particularly women in STEM.

Conclusion

Dr. Asima Chatterjee's curiosity and dedication led to groundbreaking discoveries in medicinal plants, advancing Indian science and inspiring future generations to pursue innovation and excellence in the field.

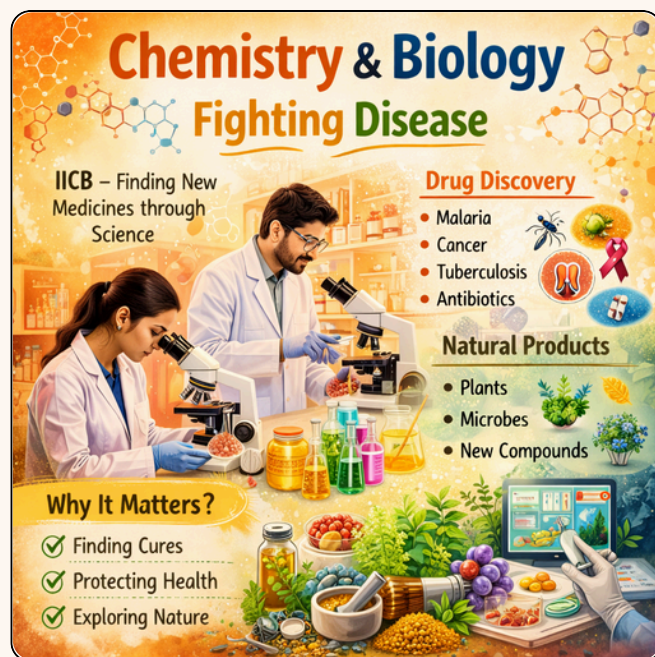
IICB - Indian Institute of Chemical Biology

Have you ever wondered how new medicines are discovered? How do scientists identify chemicals that can fight diseases? Researchers at the **CSIR-Indian Institute of Chemical Biology (IICB)** work on answering these questions by combining **chemistry and biology** to understand diseases and develop new treatments.

Located in **Kolkata**, IICB is a research institute under the **Council of Scientific and Industrial Research (CSIR)**. The institute focuses on studying how **chemical molecules interact with living systems**. This field, known as **chemical biology**, helps scientists discover drugs and understand how diseases affect the human body.

Scientists at IICB study several important diseases, including **malaria, tuberculosis, and cancer**. By understanding how these diseases work at the molecular level, researchers can design chemical compounds that may help stop or slow down these illnesses. Many of the institute's projects focus on **drug discovery**, where scientists test thousands of molecules to find those that can become effective medicines.

IICB also works on **natural product research**, studying chemicals found in plants and microorganisms. Many medicines used today originally came from natural sources, and scientists at IICB continue to explore nature to discover new compounds that could become future drugs.



Activity Idea for Teachers

Teachers can introduce students to the idea of **chemicals in everyday life** through a simple classroom discussion and observation activity. Ask students to list substances they use daily such as soap, medicines, spices, or disinfectants and identify the role of chemicals in each.

Teachers can guide students to discuss questions like:

- How do chemicals help fight germs?
- Why do medicines work inside our bodies?
- Can plants also contain useful chemicals?

This activity helps students understand that **chemistry and biology work together** in many aspects of life. It also shows how institutes like IICB are using science to discover medicines and improve human health.



Cover Story

Ideas Born in Classrooms

Where Do Great Ideas Begin?

Close your eyes and imagine this: a student sitting in a classroom, noticing something small, a leaking tap, a broken bench, a heavy school bag, or even long queues for drinking water. While many ignore these problems, a curious student asks:

“Why does this happen? Can I solve it?”

That question is the starting point of innovation.

Innovation does not begin in large laboratories or expensive research centres. It begins with **curiosity, observation, and a willingness to solve real-life problems.** Classrooms are the perfect place for this because students are constantly learning, experimenting, and interacting with the world around them.

In India, where diversity brings a wide range of challenges from rural water shortages to urban pollution, students have countless opportunities to think creatively.

A Brief Background: Why Student Innovation Matters

India has one of the largest student populations in the world, with millions of young minds attending schools every day. This makes classrooms one of the biggest hubs of potential innovation.

However, traditional education focused mainly on:

- Memorization
- Exams
- Theoretical knowledge

Today, education is evolving toward:

- Problem-solving
- Creativity
- Practical application



Government initiatives like Atal Innovation Mission and Atal Tinkering Labs are encouraging students to build models, experiment, and think like scientists.

Why is this important?

- Students understand **local problems better**
- They can create **low - cost solutions**
- They bring **fresh and creative ideas**
- Early innovation builds confidence and skills

Example: A student in a village may design a water-saving system better suited to local needs than a large company.

What Does “Ideas Born in Classrooms” Mean?

This concept focuses on turning learning into action.

It involves:

- Observing surroundings carefully
- Asking meaningful questions
- Connecting textbook knowledge with real life
- Creating solutions using simple materials.

Fun Facts: Did You Know?

The first computer ideas were developed by young thinkers experimenting with machines

Key Characteristics of Classroom Innovation:

- **Simple** – Does not require expensive tools
- **Practical** – Solves real problems
- **Creative** – Uses new ideas
- **Impactful** – Helps people



For example:

- A student noticing food waste in school may design a compost system
- Another student may create a device to reduce electricity usage

Innovation is not about complexity; it is about usefulness.

From Problem to Innovation: The Scientific Thinking Process

Every innovation follows a logical and scientific process. This process helps turn ideas into reality.

Step 1: Observation

Carefully notice problems around you.

Example: Water wastage in school taps.

Step 2: Questioning

Ask why the problem exists.

Example: Why are taps left open?

Step 3: Idea Generation

Think of possible solutions.

Example: Automatic tap system.

Step 4: Experimentation

Test your idea using models or prototypes.

Step 5: Improvement

Make changes based on results.

Step 6: Application

Use the solution in real life.

This process develops:

- Logical thinking
- Analytical skills
- Creativity

Examples of Student Innovations

1. Low - Cost Water Filter



Water contamination is a major issue in many parts of India. Students designed simple water filters using with the give items.

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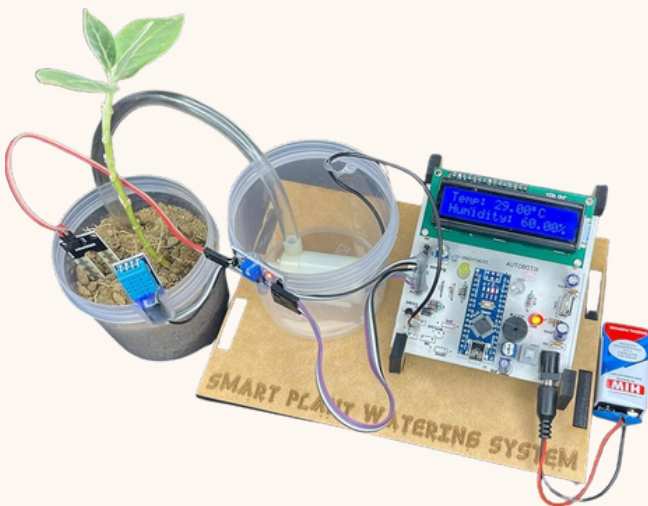
- Sand (removes particles)
- Charcoal (removes impurities)
- Cotton (filters fine particles)

Impact:

- Affordable solution for rural areas
- Easy to build and maintain
- Promotes awareness about clean water

2. Automatic Plant Watering System

Using simple sensors, students created systems that water plants automatically.



Working:

- Sensor detects dry soil
- Water is released automatically

Impact:

- Saves water
- Useful for farmers and homes

DIY Activity : Drip Irrigation Model

Observe:

- Water flow rate
- Soil moisture over time

3. Waste Segregation Device

Students created systems to separate waste into:

- Wet waste
- Dry waste

Impact:

- Improves recycling
- Keeps surroundings clean



DIY Activity: Paper Bridge Engineering

Add Challenge:

- Use only one sheet
- Try different shapes (folded, rolled)

Challenges Students Face

- Lack of resources
- Fear of failure
- Limited exposure

Solutions:

- Use low - cost materials
- Learn from mistakes
- Collaborate with peers

How Teachers and Schools Can Help

1. Encourage questioning

Instead of focusing only on correct answers, teachers should:

- Encourage students to ask “why” and “how”
- Appreciate curiosity, even if questions seem simple
- Create a safe environment where students are not afraid to speak.

2. Provide lab access

Students learn best when they **do, not just listen.**

Teachers can:

- Conduct simple experiments in class
- Encourage model - making and projects
- Use everyday materials for demonstrations

3. Organize competitions

Teachers can:

- Guide students in building prototypes
- Help refine ideas
- Encourage participation in science fairs and competitions

4. Integrate Technology and Modern Tools

Where possible, teachers can introduce:

- Basic coding
- Robotics kits
- Digital simulations

5. Inspire Through Role Models

Teachers can share stories of:

- Indian scientists
- Young innovators
- Student success stories

6. Connect Learning to Real-Life Problems

Teachers should help students see how science applies to daily life:

- Water conservation → school taps
- Electricity saving → classroom lights
- Waste management → school campus

From Classroom to Real World

Ideas developed in classrooms can:

- Become startups
- Solve community problems
- Improve daily life

Example: A simple water filter can help an entire village.

Conclusion:

A classroom is not just a place where lessons are taught, it is a **launchpad for ideas that can transform society.** Every invention, whether big or small, begins with a question.

When students observe their surroundings, identify problems, and attempt solutions, they move from being passive learners to **active innovators.**

India today stands at a crucial point where it needs **homegrown solutions** for challenges like sustainability, healthcare, agriculture, and technology. The strength of our country lies in its youth, millions of students sitting in classrooms with untapped potential.

Microbial Fuel Cell

Synopsis: This project demonstrates how electricity can be generated from sewage water using a Microbial Fuel Cell. It uses naturally occurring bacteria like E. coli to break down organic waste and release electrons, which are captured to produce electrical energy. The setup includes simple materials such as containers, electrodes, wires, and a galvanometer to visualize the current generated, making it an innovative and educational model for sustainable energy production.

Problem: Sewage water is often treated as waste and left unused, causing environmental pollution. At the same time, there is an increasing need for clean, renewable, and low - cost energy sources, especially in resource - constrained settings.

Solution: By using a microbial fuel cell setup, the project converts waste into energy. Bacteria decompose organic matter, releasing electrons that flow through a circuit to generate electricity. This method offers an eco - friendly way to manage waste while producing usable power.

(Source: INSPIRE MANAK NLEPC 2014 Booklet)



Ayan Choudhry
9th Class



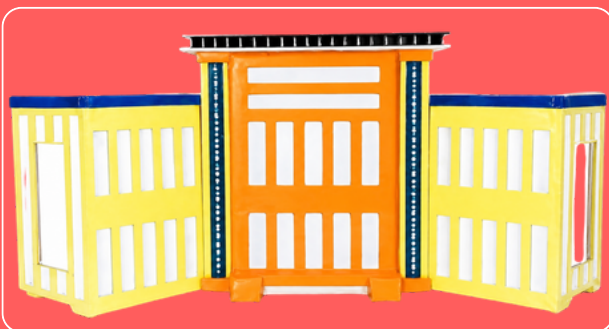
Cool Home

Synopsis: This project presents a passive cooling solution for buildings using layered roofing with ceramic tiles, air chambers, and insulating sheets. It applies the principle of thermal insulation to naturally reduce heat entering the upper floors of homes without relying on electricity.

Problem: Buildings, especially upper floors, absorb excessive heat from direct sunlight, leading to uncomfortable indoor temperatures and increased dependence on energy - intensive cooling methods like air conditioners.



A Padmaja
10th Class



Solution: The model uses glossy ceramic tiles to reflect sunlight and multiple insulating layers, including plastic sheets and air gaps, to block heat transfer. These layers act as barriers, significantly reducing heat penetration and lowering indoor temperatures by 20 - 30%, providing an energy - efficient and cost - effective cooling method.

(Source: INSPIRE MANAK NLEPC 2015 Booklet)

IICT – Indian Institute of Chemical Technology

Chemistry plays an important role in many aspects of our daily lives – from medicines and fuels to plastics, fertilisers, and clean energy technologies. Scientists at the **CSIR - Indian Institute of Chemical Technology (IICT)** work to develop new chemical processes and technologies that support industries and improve everyday life.

Located in **Hyderabad**, IICT is one of the major laboratories of the **Council of Scientific and Industrial Research (CSIR)**. The institute focuses on **chemical technology, industrial chemistry, and process development**, helping transform scientific discoveries into practical solutions that industries can use.

One of the key areas of research at IICT is **drug and pharmaceutical technology**. Scientists work on developing efficient methods to produce medicines, ensuring they are safe, affordable, and accessible. IICT has contributed to improving processes for manufacturing several important drugs used in healthcare.

The institute is also involved in research related to **energy and environmental sustainability**. Scientists explore ways to produce **clean fuels, better catalysts, and greener chemical processes** that reduce pollution and energy consumption. These innovations help industries operate more sustainably while protecting the environment.

Another important contribution of IICT is in **chemical process engineering**. Researchers design and test technologies in pilot plants before they are used at large industrial scales.

This helps ensure that new technologies are efficient, safe, and economically viable.



Activity Idea for Teachers

Teachers can introduce the concept of **chemical reactions and industrial chemistry** through a simple classroom activity. Students can observe a basic reaction, such as **mixing vinegar and baking soda** and watch how carbon dioxide gas is produced.

Teachers can ask students to think about:

- What new substances are formed during a reaction?
- Why do chemical reactions release gas or heat?
- How might industries use controlled chemical reactions to produce useful products?

This activity helps students understand that **chemical reactions are the foundation of many industrial processes**, connecting classroom chemistry to real - world research conducted at institutes like IICT.

Yellapragada Subbarao



(12th Jan 1895 - 8th Aug 1948)

Yellapragada Subbarao was a renowned Indian scientist born on 12 January 1895 in Bhimavaram. A pioneering biochemist, he made major contributions to medicines for cancer and filariasis. After studying at Madras Medical College, he moved to the United States and joined Harvard Medical School. He passed away on 8 August 1948 in New York City, leaving a lasting impact on medical research.

Scientific Contributions

Dr Subbarao's work changed the field of medicine forever.

Discovery of ATP

He was instrumental in discovering ATP, the cell's energy currency, pivotal to modern biology and biochemistry.

Discovery of Folic Acid

He developed a method to synthesise folic acid (Vitamin B9), essential for treating anaemia and nutritional disorders.

Cancer Medicine - Methotrexate

One of his greatest contributions was methotrexate, an early anti - cancer drug still used for cancer, arthritis, and autoimmune diseases.

Medicine for Filariasis

He discovered Diethylcarbamazine (DEC), an important medicine used to treat filariasis (elephantiasis).

Antibiotics Research

Under his leadership, chlortetracycline, the first tetracycline antibiotic, was discovered to fight bacterial infections.

Awards and Recognition

Although he did not receive many awards during his lifetime, today he is widely honoured as one of the greatest Indian scientists. India released a commemorative postal stamp in his honour. Streets and institutions have been named after him. He is remembered as a medical research pioneer.

Legacy

Dr. Yellapragada Subbarao's discoveries continue to save lives even today. His work in Cell biology, cancer medicine, vitamins, antibiotics, and tropical diseases has made him a legend in science. Many people call him "the forgotten genius of Indian medical science."

Conclusion

He was one of India's greatest medical scientists whose discoveries led to life - saving drugs for cancer and other diseases.

Innovation Training Module

The Classroom Inventor



Have you ever sat in your classroom during a long afternoon period and thought, "There has to be a better way to do this?"

Maybe your school bag feels too heavy while climbing three floors every morning. Perhaps students in your class waste notebooks by tearing pages unnecessarily. Maybe the classroom becomes extremely hot after lunch when the fans are not enough during summer. Or perhaps you have watched students searching frantically for lost pens five minutes before an exam begins.

These may look like ordinary school problems, but hidden inside these small frustrations are opportunities for innovation.

The truth is, some of the best ideas are not born in huge laboratories or expensive research centres. They begin in classrooms - in the minds of students who observe carefully and think differently.

Innovation Is Closer Than You Think

When we hear the word innovation, we often imagine robots, space technology, or complicated machines. Many students think inventors are extraordinary geniuses who work in giant laboratories. But innovation is actually much simpler.

Innovation begins when someone notices a problem and asks:

"Can this be improved?"

That is exactly how many inventions started.

A student tired of carrying heavy books may think of a better storage system for classrooms. Someone irritated by leaking water taps may imagine an automatic water - saving device.

A child struggling to revise lessons may create colourful flashcards or a digital study app.

These ideas may appear small at first, but every great innovation once began as a simple thought.

Indian Classrooms Are Full of Ideas

Indian students experience unique challenges every day, and many of these can inspire creative thinking.

Think about situations students commonly face:

- During summer, classrooms become extremely warm, especially in schools without air - conditioning.
- Many students travel long distances by bus or auto every morning.
- Water coolers often have long queues during lunch break.
- School bags become heavier as classes increase.
- Chalk dust can make classrooms uncomfortable.
- In some schools, students struggle with lack of storage space or insufficient charging points for digital devices.

Now imagine if students started designing solutions for these issues.

A group of students in rural India once created a low - cost cooling system using earthen pots and recycled materials to reduce classroom heat. Another student designed a rainwater harvesting model for their school after noticing water shortages every summer. Across India, students participating in science exhibitions and ATL (Atal Tinkering Labs) competitions are already creating low-cost solutions for local problems.

The exciting part is that innovation does not depend on expensive technology. It depends on observation and creativity.

Why Students Make Great Innovators

Students are naturally curious. They ask questions adults often ignore.

Why do school bags become so heavy?

Why is so much paper wasted during exams and assignments?

Why are classroom lights left on even when sunlight is enough?

Why do students forget homework so often?

Why can't classrooms become more eco-friendly?

These questions are important because innovation begins with curiosity. Students experience school life directly every day, so they understand these problems better than anyone else.



Many adults become used to problems and stop noticing them. Students, however, still observe the world with fresh eyes. That is why young minds often come up with surprisingly creative solutions.

Some Famous Innovations Started with Simple Problems

One important thing students should understand is that many famous inventions came from ordinary situations.

Sticky notes were invented because someone wanted bookmarks that would not fall out of books.

Velcro was inspired by seeds sticking to clothes during a walk outdoors.

Wheels on suitcases appeared because carrying heavy luggage was difficult.

Even simple innovations inside Indian homes came from observing everyday needs pressure cookers, steel lunch boxes, foldable furniture, water purifiers, and rechargeable emergency lights all became popular because they solved real-life problems.

Innovation is not about creating something complicated. It is about making life easier, smarter, or better.

The Fear of “Wrong Ideas”

One of the biggest reasons students hesitate to share ideas is fear.

“What if people laugh?”

“What if my idea sounds silly?”

“What if it doesn't work?”

But every inventor in history has failed many times before succeeding. Scientists conduct hundreds of experiments before discovering results. Engineers redesign products repeatedly before they work properly.

Failure is not the opposite of innovation – it is part of innovation.

Imagine if students stopped trying after failing once in a science project or model – making competition. Many brilliant ideas would never exist.

Creative thinking grows when students feel confident enough to experiment without fear.

Teachers Can Build Innovation - Friendly Classrooms

Teachers play a very important role in encouraging innovative thinking. A single encouraging teacher can completely change how students see themselves.

When teachers listen patiently to unusual ideas instead of dismissing them immediately,

students begin believing their thoughts matter.

Innovation - friendly classrooms do not need expensive equipment. Even simple activities can inspire creativity:

- Asking students to redesign an everyday object
- Organising “Best Out of Waste” activities
- Conducting brainstorming sessions
- Encouraging local problem - solving projects
- Holding classroom debates on future technology
- Creating an “Idea Corner” where students share suggestions

For example, a teacher could ask:

“How can we reduce plastic waste in school?”

The answers may surprise everyone.

Some students may suggest reusable notebooks. Others may design awareness posters or recycling systems. One small classroom discussion could inspire a meaningful environmental project.

Innovation Beyond Science

Many students believe innovation belongs only to science and robotics. This is not true.

Innovation can happen in:

- Art
- Sports
- Literature
- Environmental conservation
- Music
- Community service
- Design
- Education

A student creating a new storytelling style is innovating.



A student creating a new storytelling style is innovating.

A group organising a campaign to save water in school is innovating.

A student finding a creative way to help weaker classmates learn mathematics is innovating.

Innovation simply means creating positive change.

India Needs Young Innovators

India is one of the youngest countries in the world. The ideas created by today's students may shape tomorrow's future.

The country faces important challenges:

- Water scarcity
- Pollution
- Traffic congestion
- Plastic waste
- Energy conservation
- Climate change

Future solutions will come from young minds who are willing to think creatively and solve problems practically.

This is why schools must encourage students not only to memorise lessons but also to observe, question, and imagine better possibilities.

The next important innovation may not come from a giant company or foreign laboratory.

It may come from:

- A student in a government school in Rajasthan thinking about water conservation
- A child in Kerala designing a flood - warning model
- A student in Delhi creating a low - cost air - quality solution
- A young innovator in a village school building solar - powered devices

Big ideas can begin anywhere.

A Small Challenge for You

Tomorrow, walk into your classroom like an inventor.

Observe everything carefully.

Notice:

- What wastes time?
- What creates difficulty?
- What can become more eco - friendly?
- What problem affects students daily?

Write down three problems you observe in school.

Now think of one possible solution for each.

Your ideas do not need to be perfect. Every innovation starts as a rough thought before becoming something meaningful.

Final Thought

Classrooms are not just places where students prepare for examinations. They are places where imagination grows, questions are explored, and ideas are born.

The next time you notice a problem around you, do not ignore it.

Observe it. * Think about it. * Try solving it.

Because innovation begins the moment someone asks:

“Can this be made better?”

Word Search 2604

Properties of Matter

S	S	O	E	R	U	T	A	R	E	P	M	E	T
M	O	T	A	H	N	O	I	T	O	M	S	M	O
P	A	R	T	I	C	L	E	S	S	S	A	M	E
R	E	A	E	L	I	Q	U	I	D	L	E	I	I
Q	S	E	M	U	L	O	V	T	E	A	U	E	D
F	E	L	R	L	E	I	M	R	S	H	E	D	S
O	E	P	A	H	S	M	O	U	O	A	S	A	O
S	H	M	M	I	U	S	R	R	N	W	G	F	E
O	E	S	A	O	O	E	L	T	I	I	P	A	D
L	A	T	P	T	S	A	A	O	M	V	S	S	R
I	T	M	R	D	T	L	I	O	W	U	D	T	A
D	T	M	S	A	A	E	D	C	S	E	R	E	A
S	A	E	E	R	H	T	R	R	E	H	R	R	O
U	I	I	A	T	E	E	H	I	U	I	T	I	O

MEASURE	GAS	PARTICLES	THREE
ATOM	SHAPE	TEMPERATURE	HEAT
SLOWER	MOTION	FASTER	VOLUME
SOLIDS	LIQUID	MATTER	

(Answers on Back Cover Inside)

Hydraulic Crane

Synopsis: This project demonstrates a hydraulic crane model using materials like syringes, pipes, and a motor. Based on Pascal's Law, it shows how hydraulic systems enable efficient lifting and movement of heavy loads with minimal effort.

Problem: Lifting and transporting heavy goods manually is difficult, inefficient, and unsafe, especially in industries, construction sites, and shipyards.



Solution: The model uses hydraulic pressure and a three-lever system to lift, control, and move loads easily. Additional lighting enables operation in low-light conditions.

This demonstrates how hydraulic cranes improve efficiency and safety in handling heavy materials across industrial applications.



Mohammad Monish
8th Class

(Source: INSPIRE MANAK NLEPC 2012 Booklet)

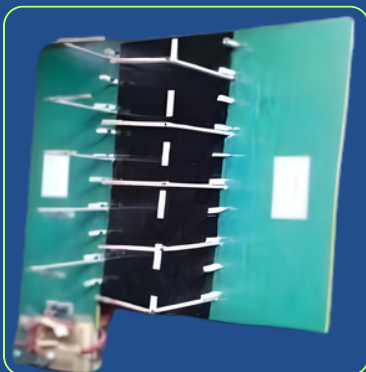
Power Saver Streetlights

Synopsis: This project presents an intelligent street lighting system using infrared sensing and LED lights to reduce energy wastage. It automatically controls streetlights based on vehicle movement, ensuring efficient, smart energy use.

Problem: Traditional streetlights remain ON even when roads are empty, especially in low-traffic areas, leading to unnecessary electricity consumption, higher costs, and resource wastage.



Dakshatha. S
8th Class



Solution: The system uses IR sensors and a microcontroller to detect vehicles and switch on only nearby lights, turning off the others. Energy-efficient LED lights further reduce consumption. This automated, low-cost system improves efficiency, lowers maintenance, and enables real-time monitoring, making street lighting smarter and more sustainable.

(Source: INSPIRE MANAK NLEPC 2013 Booklet)

Advanced Medium Combat Aircraft



Look up at the sky and imagine an aircraft that is almost invisible to enemy radars, flies faster than sound, carries advanced weapons, and is designed in India.

That aircraft is the **AMCA (Advanced Medium Combat Aircraft)**, India's next - generation stealth fighter jet.

India has already developed aircraft like the HAL Tejas, and now it is stepping into an even more advanced level of aerospace technology with AMCA.

This is not just a defence project, it is a symbol of **innovation, scientific progress, and self-reliance.**

What is AMCA?

The **AMCA** is a **5th - generation stealth fighter aircraft** being developed by:

- Defence Research and Development Organisation
- Aeronautical Development Agency

It is designed to perform multiple roles:

- Air combat
- Ground attack
- Surveillance
- Electronic warfare

Why Does India Need AMCA?

India needs advanced aircraft for

- National security
- Reducing dependency on foreign imports
- Competing with global defence technologies

AMCA supports the vision of **“Make in India”**.



2. Aerodynamics

Aircraft design ensures:

- Smooth airflow
- Reduced drag
- Better lift



Similar principles are used in paper aeroplanes you make!

3. Supercruise

AMCA can fly at **supersonic speeds without afterburners**. It saves fuel and improves efficiency.



4. Advanced Avionics

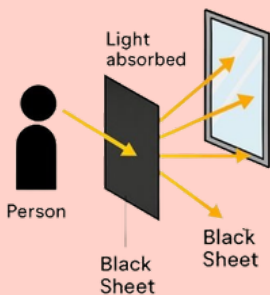
Includes:

- Smart sensors
- AI – based systems
- Digital cockpit

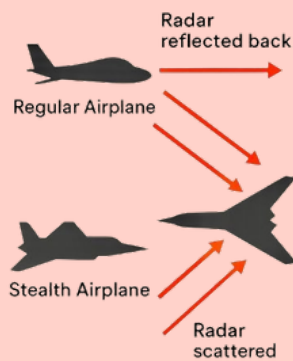
Where Will It Be Used?

- By the Indian Air Force
- In high – security missions
- Across different terrains (deserts, mountains, seas)

Light Reflection



Radar Wave Reflection



What Makes AMCA Special?

AMCA is based on advanced scientific concepts:

1. Stealth Technology

Stealth means avoiding detection by radar

How?

- Special aircraft shape
- Radar – absorbing materials
- Internal weapon storage

5. Internal Weapons Bay

Weapons are stored inside the aircraft to maintain stealth.



The Problem

- Enemy radars can detect aircraft easily.
- Modern warfare is changing rapidly
- Traditional jets are more visible
- Faster response and precision are required.
- India depended on imported fighter jets for many years.
- Limited control over technology.
- Dependence on other countries.
- High development cost.
- Complex technology.
- Requires skilled manpower.
- Long development time

How Does It Work?

1. Takeoff using thrust from engines
2. Airflow over wings creates lift
3. **S**tealth design reduces radar signals
4. Sensors detect threats
5. Pilot controls using digital systems

DIY Activities

Activity 1: Stealth Paper Plane

Try this:

- Make two paper planes
- One with sharp angles, one normal

Observe which flies better and think about airflow

Activity 2: Airflow Experiment

Blow air over curved paper

Observe lift (aerodynamics)

Activity 3: Radar Concept Demo

Use a mirror and torch:

- Shine light → observe reflection.

Understand how radar waves behave

Answer in your own words

- What is stealth technology?
- Why is AMCA important?

Conclusion:

AMCA is more than just an aircraft; it is a result of **years of learning, experimentation, and innovation.**

It proves that:

- Science taught in classrooms has real-world applications
- Indian students can build world – class technology
- Innovation starts with curiosity

Big innovations don't begin in big labs.

They begin with curious minds.

And those minds are sitting in classrooms today.

NEERI - National Environmental Engineering Research Institute

Imagine a world with polluted rivers, unsafe air, and accumulating waste. Who tackles these environmental issues using science and technology? One key institution in India is the National Environmental Engineering Research Institute.

NEERI, originally established as the Central Public Health Engineering Research Institute (CPHERI) on 8 April 1958, was renamed in 1974 by Prime Minister Indira Gandhi to emphasize environmental science and pollution control. Headquartered in Nagpur, it has regional labs in several major cities.

Objectives

The main objectives of NEERI are to conduct advanced environmental research, develop pollution control and green technologies, provide scientific solutions for sustainable development, support government policies and regulations, and industries in eco-friendly practices.

Significance of NEERI

NEERI plays a vital role in India's environmental research ecosystem. It supports national environmental policies, pollution control systems, Smart City and Swachh Bharat initiatives, and sustainable industrial practices. The institute is also a leading centre for environmental monitoring, ecological restoration, public health engineering, and green technology development.

Collaborations

NEERI collaborates with government ministries, state pollution control boards, universities, Industries, International agencies, and health organizations. Recent collaborations include MoUs with public health and environmental bodies to advance the **One Health concept**, which links human health and the environment.

Achievements

NEERI's key achievements include nationwide air quality monitoring since 1978, developing water purification and defluorination technologies, and a saline gargle-based COVID-19 testing method. The institute is also known for waste - to - wealth technologies and is one of India's oldest and most respected environmental engineering organizations.

Conclusion

NEERI is a vital scientific guardian for India's environment and public health challenges. Through innovation and research, it develops green technologies and supports environmental policies, promoting a cleaner, sustainable future.





S&I Article

ECO-FRIENDLY LIVING

Small choices. Big impact. For a greener, healthier planet.

Look around your plastic bottles, vehicles on roads, electricity usage, and food waste. These are part of our daily lives. But have you ever wondered how these everyday actions affect our planet?

The Earth is like our home. Just like we keep our rooms clean, we must also take care of our environment. However, rapid industrial growth, population growth, and overuse of natural resources have created serious environmental challenges, including pollution, climate change, and biodiversity loss.

This is where the idea of **eco - friendly living** comes in.

Eco - friendly living means making choices that **do not harm the environment** and help preserve resources for future generations. The best part Even small actions by students like you can create a huge impact

A Brief Background: How Did the Problem Begin?

Before industrialisation, humans lived more in balance with nature. People used natural materials, reused items, and generated very little waste.

But after the Industrial Revolution:

- Factories increased
- Fossil fuels were heavily used
- Plastic production grew rapidly

Today, India faces:

- Air pollution in cities like Delhi
- Water pollution in rivers like the Ganga River
- Increasing plastic waste

These challenges highlight the need for eco-friendly living. Eco - friendly practices are based on scientific concepts like

- **Sustainability** – Using resources without exhausting them
- **Carbon footprint** – Every activity (like using electricity or travelling) releases carbon dioxide (CO₂). Reducing this is key to fighting climate change.
- **Renewable energy** – Energy from natural sources like the sun and wind

Understanding these helps us make smarter decisions.

1. Reduce, Reuse, Recycle – The 3Rs



Reduce

Use fewer resources.

For example:

- Switch off lights when not needed
- Avoid single – use plastics

Reuse

Use items again:

- Reuse notebooks
- Use cloth bags instead of plastic ones

Recycle

Convert waste into new products:

- Paper recycling
- Plastic recycling

2. Say No to Plastic

Plastic takes hundreds of years to decompose.

In India:

- Many animals accidentally eat plastic
- Drainage systems get blocked

Alternatives:

- Cloth bags
- Steel bottles
- Paper packaging

Government campaigns like Swachh Bharat Abhiyan promote reducing plastic use.

Fun Fact:

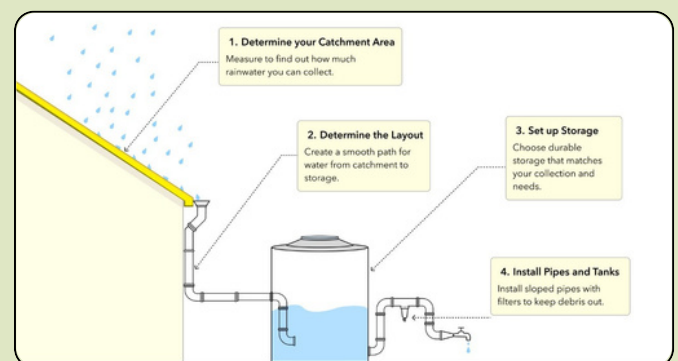
Do you know a single plastic bottle can take up to 450 years to decompose?

3. Save Water – Every Drop Counts

Water is essential for life, yet many parts of India face water shortages.

Ways to save water:

- Turn off taps while brushing
- Fix leaks
- Use buckets instead of showers



Scientific innovation:

- Rainwater harvesting systems

Fun Fact

Growing 1 kg of rice can use **3,000 – 5,000 litres of water.**

DIY Activity: Water Filter Challenge

Objective: Clean dirty water using simple materials

Materials:

- Sand
- Charcoal
- Gravel
- Bottle

Challenge:

Make the clearest water possible!

Concept: Filtration & purification

4. Energy Conservation – Save Electricity

Electricity is often generated from fossil fuels, which cause pollution.



Tips:

- Use LED bulbs
- Switch off unused devices
- Use natural light

Renewable energy:

- Solar energy
- Wind energy

5. Eco - Friendly Transportation

Vehicles release harmful gases.



Better options:

- Walking or cycling
- Public transport
- Carpooling

Electric vehicles (EVs) are becoming popular in India.

6. Waste Management and Composting

Waste should be separated into:

- Wet waste (food)
- Dry waste (plastic, paper)

Composting:

Convert kitchen waste into fertiliser.

DIY Activity: Composting at Home

Objective:

Learn how waste turns into useful fertiliser.

Materials Needed:

- Vegetable peels
- Soil
- Container

Steps:

1. Add kitchen waste to the container
2. Cover with soil
3. Mix regularly
4. Wait for 2 – 3 weeks

Science Concept:

Decomposition by microorganisms

Role of Technology in Eco-Friendly Living

Technology helps in:

- Monitoring pollution
- Saving energy
- Smart waste management

Role of Students as Future Innovators

Students are not just learners; they are **future problem - solvers.**

You can:

- Create eco - friendly projects
- Spread awareness
- Innovate solutions

Simple Daily Habits You Can Start Today

- Carry your own water bottle
- Use both sides of the paper
- Plant trees
- Avoid food waste
- Save electricity

Small steps lead to big change.

Conclusion

Eco-friendly living is not difficult, it just requires awareness and responsibility. Every small action matters. When millions of students across India take small steps, the impact becomes massive.



Sudoku Challenge 2604

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

Riddles 2604

1. I help you measure length, but also help draw straight ideas. What am I?
2. I am invisible, but I carry signals and data. I help smart classrooms and modern learning. What am I?
3. I am full of questions, answers, and exploration. Without me, innovation cannot grow. What am I?
4. I connect wires and make things work. In student projects, I bring ideas to life with energy. What am I?
5. I am a place where ideas are tested, not just taught. You wear coats and use me to discover. What am I?

(Answers on Back Cover Inside)

Multipurpose Exerciser - Cum - Waterlifter

Synopsis: The Multipurpose Exerciser-cum-Water Lifter is an innovative model that combines cycling, water pumping, and electricity generation. It uses a pedalling motion to operate a pump and generate power, applying principles of energy conversion. The system stores generated electricity in a battery, making it a practical and sustainable solution.

Problem: Accessing water at higher levels is difficult in many households, especially where electricity or pumping systems are limited. Additionally, there is a lack of affordable solutions that combine utility with health benefits.



Deepika Devi
9th Class



Solution: This model uses a bicycle mechanism to simultaneously lift water, generate electricity, and promote exercise. As the user pedals, the pump lifts water and charges a battery. It is cost-effective, eco-friendly, and improves health while addressing daily water and energy needs.

(Source: INSPIRE MANAK NLEPC 2016 Booklet)

In-built Fuel Protection Device

This fuel theft prevention filter is a protective device designed for heavy vehicles to stop fuel siphoning and reduce diesel or petrol theft from vehicle tanks.

Problem: Fuel theft through hosepipe siphoning is a common issue in heavy vehicles like lorries, leading to financial losses and operational challenges for fleet owners.



Aahil Ali
7th Class

Solution: The device is securely fitted to the fuel tank opening with small holes that allow fuel filling but prevent siphoning attempts. Its strong and durable design makes it difficult to remove or damage, ensuring better fuel security.

(Source: INSPIRE MANAK NLEPC 2024 Booklet)

Indian Scientist

Anil Kakodkar

Padma Shri (1998), Padma Bhushan (1999), and Padma Vibhushan (2009)



(Born On 11 November 1943)

Anil Kakodkar is one of India's leading nuclear scientists and engineers. Born on 11 November 1943 in Barwani, Madhya Pradesh, he was inspired by his freedom fighter parents, Kamala and Purushottam Kakodkar, whose values of dedication and service shaped his life.

From an early age, Anil Kakodkar was interested in science and engineering. After graduating in Mechanical Engineering from VJTI, Mumbai, in 1963, he joined Bhabha Atomic Research Centre (BARC) in 1964 and contributed to the development of the Dhruva reactor.

Scientific Contributions

Anil Kakodkar played a major role in developing India's PHWR technology, the Dhruva reactor, and the Pokhran nuclear tests of 1974 and 1998. He promoted thorium-based energy, supported the Advanced Heavy Water Reactor (AHWR), led reactor rehabilitation projects, strengthened India's nuclear self-reliance, and published over 250 scientific papers.

Awards and Recognitions

Anil Kakodkar received several prestigious honours, including the Padma Shri (1998), Padma Bhushan (1999), and Padma Vibhushan (2009) for his contributions to nuclear science.

He also received the Maharashtra Bhushan and Gomant Vibhushan awards.

Legacy

Anil Kakodkar's legacy lies in his remarkable contribution to India's nuclear science and energy development. He played a major role in making India self-reliant in nuclear reactor technology and atomic energy. His vision for thorium-based clean energy has helped shape India's future energy plans. Through his scientific leadership and dedication, he inspired many young scientists and engineers. His work continues to strengthen India's progress in science, technology, and national development.



Present Role

Anil Kakodkar currently serves as the Chancellor of Homi Bhabha National Institute (HBNI), a premier institution for advanced studies and research in nuclear science and engineering. He is also widely respected as a senior advisor and mentor in India's atomic energy and scientific research sectors.



Innovation Training Module

Curiosity Creates Innovation

During a science class, a student once asked, "Why can't our classroom roof store rainwater instead of letting it go to waste?"

The class laughed for a few seconds. But the teacher paused and replied, "That is actually a very important question."

A few weeks later, the students began researching rainwater harvesting systems. What started as one curious question slowly became a school project. By the end of the year, the class had built a working model explaining how rainwater could be collected and reused in schools.

This is the power of curiosity.

Not every question changes the world immediately. But every innovation begins with someone wondering about something others have ignored.

Why Curious Students Learn Differently

Some students study only to complete homework or prepare for examinations. Others constantly wonder about how things work.

- Why do mobile phones heat up?
- Why do roads flood so quickly during heavy rain?
- How do traffic signals work?
- Why are metro trains faster and smoother?
- Why can't schools produce their own electricity?

Curious students do not simply accept information. They explore it. They connect classroom learning to real life. They observe the world around them and think deeply about everyday situations.

This is what makes curiosity powerful – it transforms ordinary learning into discovery.

India Is Full of Questions Waiting to Be Explored

Indian students live in one of the most diverse and fast – changing countries in the world. Every city, town, and village presents unique challenges and opportunities for innovation.

- A student in Bengaluru may wonder how technology can reduce traffic congestion.
- A child in Rajasthan may think about ways to conserve water during extreme summers.
- Students in coastal Kerala may become curious about flood management systems.
- A teenager in Delhi may think about reducing air pollution.
- A student in a hill town may wonder how schools can access cleaner energy more efficiently.

The beautiful thing about curiosity is that it connects learning to real life. Students begin understanding that science, mathematics, social science, and technology are not just textbook subjects, they are tools for solving problems around us.

Some of the Best Ideas Begin with Simple Questions

Many inventions that seem ordinary today were inspired by very simple thoughts.

The inventor of the microwave oven became curious after noticing a chocolate bar melting near a machine.

The idea for wireless earphones came from people wanting freedom from tangled wires.

Online payment systems grew because people wondered if transactions could become faster and easier.

Even many Indian innovations were inspired by local needs. Affordable water purifiers, low-cost sanitary products, solar lanterns, and digital payment systems became successful because someone carefully observed a problem and searched for a practical solution.

Innovation does not always begin with big ambitions. Often, it begins with irritation, inconvenience, or curiosity.

The Problem with Always Wanting the “Right Answer”

In many classrooms, students feel pressure to answer quickly and correctly. Over time, some students become afraid of asking questions because they worry their doubts may sound silly.

But learning is not only about giving correct answers.

Sometimes the most important learning begins with uncertainty.

Imagine if scientists stopped asking questions because they feared making mistakes. There would be no satellites, no medicines, no internet, and no space exploration.



Curiosity requires courage because questioning means admitting that we do not know everything yet.

And that is completely okay.

In fact, some of the smartest people in the world are those who continue asking questions throughout their lives.

Curiosity Makes Learning More Exciting

Think about the difference between memorising a chapter about electricity and actually wondering how electricity reaches your home during a thunderstorm.

One feels like studying.

The other feels like discovery.

Curiosity makes learning active instead of passive. Students become more engaged because they begin connecting lessons with real experiences.

For example:

- A mathematics lesson on percentages becomes more interesting when linked to cricket strike rates or shopping discounts.
- Physics feels exciting when students relate it to bikes, lifts, fans, or roller coasters.
- Biology becomes meaningful when students connect it to fitness, nutrition, or diseases.
- Environmental science becomes powerful when students observe pollution or water scarcity in their own communities.

The moment students start connecting learning with life, education becomes far more meaningful.

Teachers Who Encourage Questions Create Future Innovators

Most students remember teachers who encouraged them to think freely.

Sometimes one sentence from a teacher can build enormous confidence:

"That's an interesting thought."

"Let's explore that idea."

"Can anyone think differently about this?"

When students feel safe asking questions, classrooms become more creative and energetic. Discussions become richer. Students begin participating more actively. They stop learning only for marks and start learning because they are genuinely interested.

Teachers do not need expensive technology to encourage curiosity. Even small classroom habits can make a difference:

- Allowing students to discuss real - life problems
- Encouraging classroom debates
- Asking open - ended questions
- Giving observation - based assignments
- Connecting lessons to local issues
- Encouraging students to explain concepts in their own way

Sometimes curiosity grows simply because someone listened seriously to a student's question.

Curiosity and Failure Go Together

Curious students often experiment. And experiments do not always work perfectly.

A model may collapse during a science exhibition.

A coding project may stop working suddenly.

An idea may sound brilliant in theory but fail during testing.

This can feel disappointing, but failure is actually an important part of innovation.



Every unsuccessful attempt teaches something valuable:

- What needs improvement
- What approach does not work
- What can be done differently next time

Many successful inventors faced repeated failures before achieving success. What made them different was not perfection - it was persistence.

Curious people continue exploring even when results are uncertain.

Innovation Is Not Limited to Laboratories

When people hear the word "innovation," they often imagine robots, machines, or complicated gadgets. But curiosity can lead to innovation in every field.

- A student creating a creative way to teach younger children is innovating.
- A young artist using recycled materials for artwork is innovating.

- A school team organising a cleanliness campaign creatively is innovating.
- A student using storytelling to explain science concepts is innovating.

Innovation is simply the ability to think differently and improve something meaningfully.

India's Future Depends on Curious Minds

India is changing rapidly. Technology, science, transportation, healthcare, and communication are evolving faster than ever before. At the same time, the country faces important challenges like pollution, waste management, energy conservation, and climate change.

The future will need people who can do more than memorise information.

It will need thinkers.

Problem - solvers.

Creators.

Question - askers.

The students sitting in classrooms today may become the scientists, entrepreneurs, engineers, writers, environmentalists, and innovators of tomorrow.

And every journey toward innovation begins with curiosity.

A Small Curiosity Challenge

Today, try observing your surroundings more carefully.

Look around your classroom, school, neighbourhood, or even your home.

Notice things people usually ignore.

Ask yourself:

- Why does this happen?
- Can this become easier?
- Can this become cleaner, safer, faster, or smarter?
- Is there a better way of doing this?

Write down three questions that genuinely make you curious.

You may be surprised how powerful one thoughtful question can become.

Final Thought

Answers are important because they help us understand the world.

But questions are even more important because they help us improve it.

Every invention, discovery, and breakthrough in history began because someone was curious enough to ask,

“Why?” or “What if?”

So never stop questioning.

- Never stop wondering.
- Never stop exploring.

Because curiosity is not just the beginning of learning - it is the beginning of innovation.



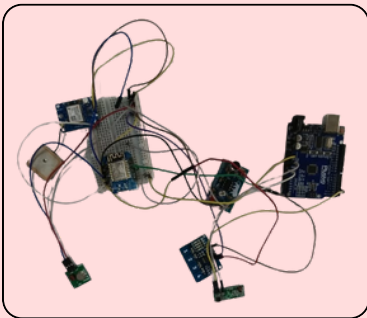
She Eye: A Multi-Layered Safety Network for Women

She-Eye is a real-time women's safety system that combines a wearable device, mobile app, and AI-based surveillance. It detects distress through sound, movement, and facial expressions, sending instant alerts for quick response and proactive safety monitoring.

Problem: Women often face harassment, stalking, and assault, but may be unable to manually trigger SOS systems during emergencies. GPS limitations indoors and delayed response mechanisms increase safety risks.



Aranya Sujato
9th Class



Solution: The system includes a wearable device with GPS and sound sensors, a mobile app for SOS alerts and tracking, and AI-powered CCTV monitoring to detect aggression or distress. It provides instant warnings through Wi-Fi, RF, or LoRa, ensuring faster emergency response and improved safety.

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

(Source: GYS Avishkar Awards 2025 Booklet)

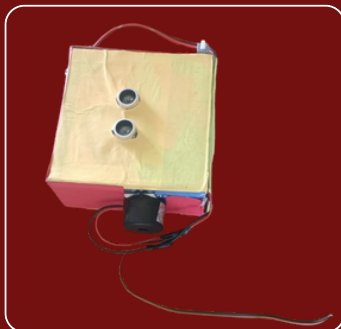
Women Safety Device in Two Wheeler Bikes

This device improves safety for women riding pillion on two-wheelers by detecting loose chunnies or pallus that may get caught in the wheels. An ultrasonic sensor triggers a loud alarm and warning light, helping prevent accidents and injuries.

Problem: Loose chunnies or pallus worn by women riding on two-wheelers can get entangled in the wheels, leading to sudden falls, serious injuries, or fatalities during travel.



M Yashaswini
9th Class



Solution: The device uses an ultrasonic sensor installed beneath the seat to detect nearby cloth. When danger is detected, it activates a loud alarm and a red warning light on the handle, alerting the rider and preventing accidents proactively.

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

(Source: GYS Avishkar Awards 2025 Booklet)

NEIST (RRL), Jorhat - North East Institute of Science and Technology, Jorhat

NEIST stands for **North East Institute of Science and Technology**. It is a premier multidisciplinary research institute located in **Jorhat, Assam**, dedicated to scientific research and technological development, especially for the North Eastern Region (NER) of India. NEIST was originally established in **1961** as the **Regional Research Laboratory (RRL), Jorhat**, under CSIR.

It promotes local and national development through regional resource - based research and innovation. NEIST, a CSIR laboratory, focuses on chemical and biological sciences, materials and petroleum research, environmental science, agro-technology, engineering, and energy. The institute plays a key role in utilizing North East India's natural resources for national growth.

Objectives

The main objectives of NEIST are to promote scientific research in the North - Eastern region, develop technologies based on local resources, support industrial growth and entrepreneurship, improve agriculture and rural development, carry out research in energy, health, and the environment, and provide solutions for regional socio-economic development.

Significance of NEIST

NEIST plays a crucial role in India's research ecosystem, especially in the North East. Its major functions include scientific development, resource utilization, technology transfer, and support for startups and innovation.

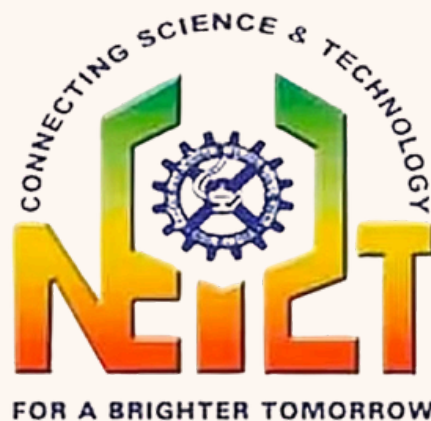
NEIST collaborates with CSIR labs, universities, IITs, state governments, industries, and biotech institutions, along with having MoUs for joint research and technology transfer.

Achievements

Key achievements of NEIST include advancements in Petroleum and Coal Research for high - sulfur coal and low - grade coal use, Natural Products and Medicinal Chemistry with plant compound extraction, and Rural Development Technologies supporting small entrepreneurs. Additionally, they excel in Infectious Disease Research with advanced pathogen detection. NEIST has been recognized for impactful publications and technology commercialization, winning the 1st prize in the Elsevier India Scopus Quiz (2011).

Conclusion

Overall, NEIST drives scientific and technological advancements in Northeast India, supporting regional development and inspiring future scientists to contribute to societal progress.



Indian Scientist

R. Venkatesan



(Born On January 26, 1961)

Dr. R. Venkatesan, a renowned Indian scientist, has made significant contributions to ocean science and marine technology. His work in ocean observation, climate studies, and marine environmental research has advanced the understanding of oceans, weather, and climate change.

Dr R. Venkatesan, senior scientist at the National Institute of Ocean Technology (NIOT), under India's Ministry of Earth Sciences, he played a key role in advancing ocean monitoring systems. He represented India in UNESCO and the World Meteorological Organisation, contributed over 190 research papers, secured 6 patents, and earned numerous awards. Widely regarded as a distinguished marine scientist, his work continues to inspire young researchers.

Early Life

He was born in India and developed a strong interest in science and the oceans from a young age. He pursued higher education in engineering and ocean technology, later becoming one of India's leading scientists in marine research and ocean observation systems.

Scientific Contributions

R. Venkatesan is a leading Indian expert in ocean science and marine technology. He helped develop ocean observation systems and India's moored buoy network for real-time sea monitoring.

His research supports cyclone forecasting, monsoon prediction, climate studies, and Arctic Ocean research through the IndARC project.

Awards and Recognitions

Received the National Award for Ocean Science and Technology

- Honoured with the Lockheed Martin Award
- Received the National Geoscience Award
- Won the Tamil Nadu State Scientist Award
- Received the NACE Fellow Award
- Recognised as an MTS Fellow

Conclusion

R. Venkatesan has made remarkable contributions to ocean science, marine technology, and climate research in India. His work in ocean observation systems and weather forecasting has helped improve disaster preparedness and environmental studies. His achievements continue to inspire young scientists to explore the mysteries of the oceans and protect our planet.





Indian Inventions

Samudrayaan

When we look up at the sky, we see space full of mysteries. But did you know that the **deep ocean is just as mysterious, if not more?** Nearly **95% of the ocean remains unexplored.**

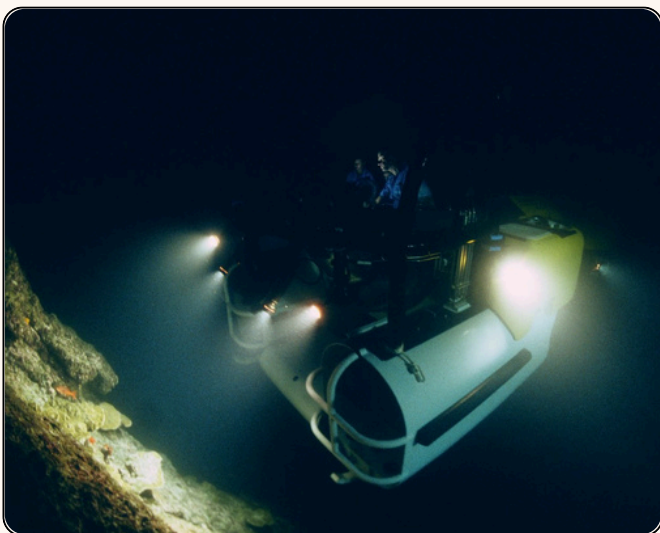
To explore this hidden world, India has launched an ambitious mission called **Samudrayaan.**

Just like space missions explore planets, Samudrayaan aims to explore the **depths of our oceans**, unlocking secrets that can help science, the environment and future innovations.

What is Samudrayaan?

Samudrayaan is India's **deep ocean exploration mission** designed to send humans underwater in a special vehicle called **Matsya 6000.**

Goal: Explore ocean depths up to **6000 meters.**



Why Explore the Ocean?

The ocean holds:

- Unknown species
- Rare minerals
- Climate secrets

It helps us understand:

- Earth's history
- Climate change
- Marine ecosystems



It helps us understand:

- Earth's history
- Climate change
- Marine ecosystems

Where will it operate?

The mission will explore:

- Deep Indian Ocean regions
- Seabed rich in minerals

When will it happen?

Samudrayaan is part of India's **Deep Ocean Mission**, expected to be completed in phases over the coming years.

Who is leading it?

The mission is led by the **National Institute of Ocean Technology (NIOT)** under the Ministry of Earth Sciences.

Why do we need it?

Challenges include:

- Ocean pollution
- Climate change
- Lack of deep-sea data

Why is this important for India?

India has:

- A long coastline
- Rich marine resources

Understanding oceans helps:

- Protect biodiversity
- Manage resources
- Improve climate prediction

Definitions

1. Deep Ocean

Ocean depths below 200 meters have no sunlight.

2. Submersible

A vehicle designed to go underwater.

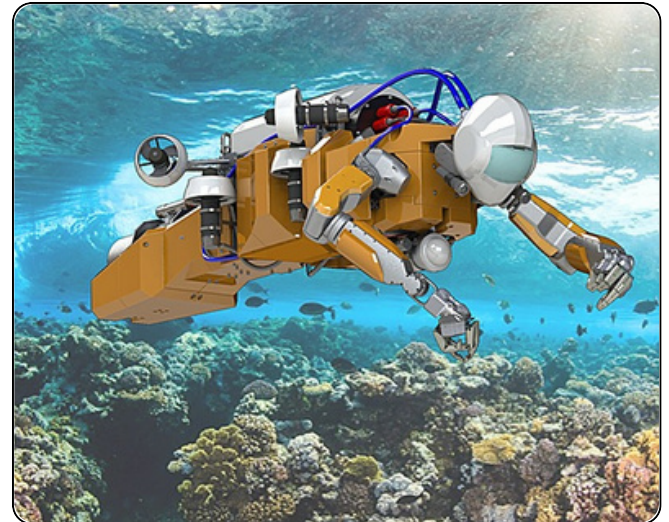
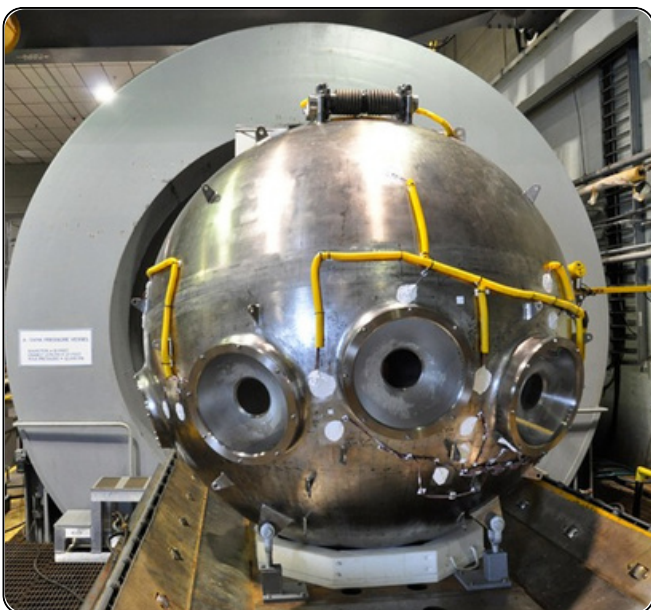
3. Hydrothermal Vents

Openings on the ocean floor release hot water and minerals.

4. Bioluminescence

Light produced by living organisms.

The Prototype: Matsya 6000



Key Features:

- Carries 3 scientists
- Titanium alloy structure
- Can withstand high pressure
- Equipped with cameras and robotic arms

How It Works: Methods & Procedures

Mission Process

1. Launch a submersible from a ship
2. Descend slowly to the ocean floor
3. Observe and collect samples
4. Record data
5. Return safely

Scientific Working

- Sensors measure temperature, pressure
- Cameras capture marine life
- Robotic arms collect samples

Samudrayaan & Daily Life Connections

- The fishery industry depends on ocean health
- Weather prediction depends on ocean data
- Coastal communities depend on marine resources

Advantages of Samudrayaan

- Exploration of unknown ocean regions
- Discovery of new species
- Resource identification
- Strengthening India's research capabilities
- Discovery of new materials
- Developing marine technology
- Creating jobs in ocean science

Limitations of Samudrayaan

- High cost
- Technical challenges
- Risk due to pressure

Impact Created

- Boosts marine science
- Encourages innovation
- Supports sustainable development

Classroom Activity for Teachers

To introduce students to the Samudrayaan Mission, the teacher can begin by asking engaging questions, such as

- What lies deep inside the ocean?
- Why is deep - sea exploration challenging?
- How can scientists survive under extreme pressure, darkness and cold?

Future Careers

- Deep-sea mining
- Marine biotechnology
- Climate research

Student Innovation Zone

Project Ideas

1. Build a **mini submersible model**
2. Study marine ecosystems
3. Design underwater robots

DIY Activity:

Floating & Sinking Submarine

Materials:

- Plastic bottle
- Balloon
- Straw
- Tape
- Water tub

Steps:

1. Fill the bottle partially with water
2. Attach a balloon inside the bottle using a straw
3. Inflate the balloon → submarine rises
4. Deflate the balloon → submarine sinks



Conclusion

The Samudrayaan Mission highlights India's growing capabilities in deep ocean exploration and its commitment to advancing scientific knowledge beyond land and space. By combining inquiry - based classroom discussions with hands - on activities, students not only understand complex concepts like underwater pressure and buoyancy but also develop curiosity and problem - solving skills.

Such learning experiences inspire young minds to explore, question and innovate, preparing them to contribute to future scientific missions and discoveries.

Robo Rail

Robo Rail is a smart sensor-based system that prevents railway accidents by detecting humans, animals, and obstacles on tracks in real time. Using Arduino UNO, GPS, motion sensors, buzzers, and wireless modules, it sends alerts and activates automatic braking, ensuring safety even in fog, rain, or at night.

Problem: Railway accidents often occur near unmanned crossings and forest routes due to poor visibility, high speeds, and a lack of real-time warnings. This leads to fatal collisions involving people, cattle, and wildlife, causing major losses and delays.



Solution: Robo Rail uses ultrasonic sensors, Arduino UNO, Driver ICs, and voltage regulators to detect obstacles and process data. It sends GPS-based alerts to stations and train engines, activating buzzers and automatic braking. Powered by rechargeable batteries, it provides continuous and scalable railway safety monitoring.



M. Kundanika
9th Class

(Source: GYS Avishkar Awards 2025 Booklet)

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

Traditional Monpa House with Thermal Insulation

The Traditional Monpa House uses locally available materials like wood, stone, mud, straw, and yak wool to provide natural insulation. Thick walls, wooden floors, and flat roofs retain heat, making the house comfortable and eco-friendly in cold climates.



Problem: Tawang experiences severe winters, and conventional houses often fail to retain warmth. This increases dependence on artificial heating, causing discomfort and environmental impact.

Solution: The model uses sustainable local materials and heat-retaining construction techniques to maintain indoor warmth naturally.



Tenzin Choekyi
10th Class

(Source: GYS Avishkar Awards 2025 Booklet)

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

Solution

Sudoku Challenge 2604

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

Solution

Word Search 2604

S	S	O	E	R	U	T	A	R	E	P	M	E	T
M	O	T	A	H	N	O	I	T	O	M	S	M	O
P	A	R	T	I	C	L	E	S	S	S	A	M	E
R	E	A	E	L	I	Q	U	I	D	L	E	I	I
Q	S	E	M	U	L	O	V	T	E	A	U	E	D
F	E	L	R	L	E	I	M	R	S	H	E	D	S
O	E	P	A	H	S	M	O	U	O	A	S	A	O
S	H	M	M	I	U	S	R	R	N	W	G	F	E
O	E	S	A	O	O	E	L	T	I	I	P	A	D
L	A	T	P	T	S	A	A	O	M	V	S	S	R
I	T	M	R	D	T	L	I	O	W	U	D	T	A
D	T	M	S	A	A	E	D	C	S	E	R	E	A
S	A	E	E	R	H	T	R	R	E	H	R	R	O
U	I	I	A	T	E	E	H	I	U	I	T	I	O

Riddle 2604 Answer

1. Ruler 2. Internet 3. Science 4. Electricity 5. Laboratory.



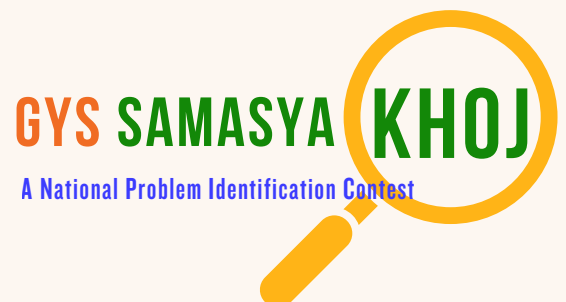
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Submissions Open

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GYS GURU PURASKAR 2026

A National Video Submission Contest Online for Working Teachers

Submissions Open: April 2026 to June 2026

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