भारतीय विज्ञान संस्थान

INDIAN INSTITUTE OF SCIENCE

Open Day

2025

SATURDAY, 1 MAR

9 AM - 5 PM

Explore, Experience & Enjoy!

LIVE EXPERIMENTS

SCIENTIFIC DEMOS

POPULAR SCIENCE LECTURES

EXHIBITIONS

PARTNER WITH US FOR A GREEN OPEN DAY

DO NOT LITTER - SEGREGATE YOUR WASTE

BRING YOUR OWN WATER BOTTLES

MESSAGE FROM THE DIRECTOR

Prof. Govindan Rangarajan
Director, IISc

It gives me great pleasure to welcome you all to Open Day at the Indian Institute of Science (IISc). The Institute was established in 1909 due to the far-sighted vision of philanthropist and industrialist Jamsetji N Tata, whose birth anniversary falls on 3 March, and is celebrated as Founder's Day. Around the same time, 28 February is celebrated as National Science Day to commemorate the discovery of the Raman effect by Sir CV Raman, a former Director of IISc.

It is in conjunction with these dates that the Institute organises Open Day every year, and throws its doors open to the public, inviting them to experience its activities and facilities first-hand. We welcome you all to visit the campus, to explore, experience and enjoy the wonders of scientific and technological research and innovation at IISc.

LIST OF DEPARTMENTS (click to view)

- Aerospace Engineering (AE)
- Biochemistry (BC)
- Bioengineering (BE)
- Centre for Cryogenic Technology (CCT)
- Centre for Atmospheric and Oceanic Sciences (CAOS)
- Centre for Brain Research (CBR)
- Centre for Earth Sciences (CEaS)
- Centre for Ecological Sciences (CES)
- Centre for High Energy Physics (CHEP)
- Centre for Infectious Diseases Research (CIDR)
- Centre for Nanoscience and Engineering (CENSE)
- Centre for Society and Policy (CSP)
- Chemical Engineering (CE)
- Civil Engineering (CIE)
- Centre for Neurosciences (CNS)
- Centre for Sustainable Technologies (CST)
- Combustion, Gasification and Propulsion Laboratory (CGPL)

- Computer Science and Automation (CSA)
- Design and Manufacturing (DM)
- Electrical Communication Engineering (ECE)
- Electrical Engineering (EE)
- Electronic Systems Engineering (DESE)
- Instrumentation and Applied Physics (IAP)
- Interdisciplinary Centre for Water Research (ICWaR)
- JRD Tata Memorial Library (LIB)
- Management Studies (MS)
- Materials Engineering (MTE)
- Mechanical Engineering (ME)
- Microbiology and Cell Biology (MCB)
- Physics (PHY)
- Robert Bosch Centre for Cyber Physical Systems (CPS)
- Supercomputer Education And Research Centre (SERC)
- Undergraduate Programme (UG)
- Developmental Biology and Genetics (DBG)
- Divecha Centre for Climate Change (DCCC)

AEROSPACE ENGINEERING (AE)

- **Unmanned Aerial Vehicle Lab:** Models of drones and unmanned air vehicle Ghatak Aditya-1 Fixed-Wing UAV, Seed Dropper Drone, Bamboo Plane. Quad-X & Hexacopter Agriculture Drones. Research Quadcopter, AI & Computer Vision Projects also few Mystery Activities

- **KidZone:** Demonstration of airfoil lift, rocket propulsion and Helicopter multirotor concept: conservation of angular momentum.

- **Autonomous Vehicle Lab** – Obstacle avoidance for UAVs, working of motion capture system and air corridors for quadcopters. The video showcases the operation of the Motion Capture Lab, demonstrating the experimental validation of the proposed guidance methods for UAVs using the CrazyFlie 2.0 drone

- **Aerospace Systems Lab & Integrated Control Guidance and Estimation Lab** Advancements in Autonomous Drone Operations: Precision Landing Techniques. Air Traffic Modelling & Simulation.

- **Open Circuit Wind Tunnel (14'x9'):** An overview of contributions of Department

of Aerospace Engineering to Indian Aerospace/Navy/Army/Automotive and Civil engineering Industry. LCA, AMCA, GSLV, PSLV, RLV , CES, CM, Missiles, TDEM, UAV, MAV, scaled version of ship models as few examples

- **Combustion Research and Advanced Diagnostics Laboratory (CRADL)**
  Ruben's tube demonstration: Interaction of flame and acoustic, Whirl flame demonstration: Effect of tangential entertainment on flame, Entrainment and liftoff of flame: Effect of natural convection on flame

- **Laboratory for Shockwave and Hypersonic Research (LSHR)**
  Live demo of Reddy tube, Schlieren visualization, supersonic jets, Measurement using Digital Image Correlation

- **Integrative Multiscale Engineering of Materials and Systems Group (iMEMS)**
  Display of Composite samples, shape memory alloys and ultrasound for health monitoring.

- **Aeroservoelasticity lab: Aeroservoelasticity:**
  A Fun Dive into Fluid-Structure Interactions

- **Non-destructive Testing and Evaluation Lab**
  Health Monitoring of Aerospace Structures using Acoustic Wave Propagation.

- **Computational Mechanics of Advanced Composites Lab**
  Introduction to Composite structures and using Machine learning for their analysis.

- **Turbulent Shear Flow Physics and Engineering Laboratory (TSFPEL):**
  An overview of the Roddam Narasimha Hypersonic Wind Tunnel.

- Participation from the following startup companies and government agencies in the field of Aerospace Applications
  - **Spacefield** • **Yaanedriya** • **ISRO.**

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BIOCHEMISTRY (BC)

The Department of Biochemistry was established in the year 1921 and is the oldest Biochemistry department in India and Asia. Nearly 1000 students have graduated from this department thus far and many of them assumed leadership positions in academia and industries in India and abroad. The Department has been carrying out research in

frontier areas of biochemistry and molecular biology for the past 100 years. In recent years new areas of research such as synthetic biology, nanobiology, viral immunology, signalling metabolomics have also been added to the department.

The department is famous for its translational research resulting in development of vaccines and diagnostics kits for the society. Multiple successful starts-ups have been spun out by the faculty in this department. We are celebrating the Centenary of the department and an exhibition highlighting past and current research activities as well as historical aspects about the department will be on display in the department for the Open Day on March 1, 2025.

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BIOENGINEERING (BE)

	Lab/Groups	Model name
1	Ajay Lab	Mechanoenvironment Model of Tumor tissue and normal tissue
2	Kaushik Lab	4D printing for biomedical applications

3	Medhavi Lab	Wound Healing ; Durotaxis
4	Mohit Lab	Waddington Landscape
5	Rachit Lab	Enhanced Permeation and Retention (EPR) effect
6	Sanhita Lab	Biomarker detection using photoacoustic imaging
7	Siddharth Lab	Neutrophil model and diabetes
8	M.Tech students	Stem cell differentiation

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CENTRE FOR CRYOGENIC TECHNOLOGY (CCT)

Centre for Cryogenic Technology (CCT) is dedicated to research in core cryogenic technology and allied sciences / engineering. The centre has a mix of research scholars, including, M.Tech (Res.), Ph.D and Postdoctoral Researcher. Occationally, faculties accept short-term interns and research fellows.

The Centre promotes and supports research dedicated to fields across natural sciences and engineering. This includes cryogenic engines & systems, cryocoolers, cryogenic instrumentation, cryo-electron microscopy &

imaging, low-temperature detectors, super-conductivity, nano-biophysics, condensed matter physics, cryobiology, cryogenic materials, single molecule physics, super-resolution microscopy, optical tweezer, imaging flow cytometry, cell biology, disease biophysics and space science & engineering. Over the last three decades, the Centre has collaborated across the science and engineering department, space missions and has a very active industrial collaboration.

Demonstrations

- Liquid Nitrogen (-196°C) and its properties
- Boyle's & Charle's law (relation between Pressure, Volume and Temperature of an ideal gas)
- Gay Lussac's law (relation between Pressure and Temperature at constant mass and volume)
- Properties of materials at cryogenic temperatures (Thermal Conductivity, Specific Heat, Youngs modulus etc.)
- Magnetic levitation (Meissner's effect)
- Resistance Vs temperature at cryogenic temperature
- Cryopreservation of cells & Microscopy (Long-term preservation of live species)
- Helium gas balloon experiment

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CENTRE FOR ATMOSPHERIC AND OCEANIC SCIENCES (CAOS)

Experiment/ Demo

- Cloud in A Bottle
- Ocean Circulation
- Weather and Climate Services
- Ocean Waves
- Vortex Rings
- El Niño and La Niña
- Atmospheric Measurements
- Stokes Flow
- Solar Geoengineering - Good, Bad, and Ugly and many more...

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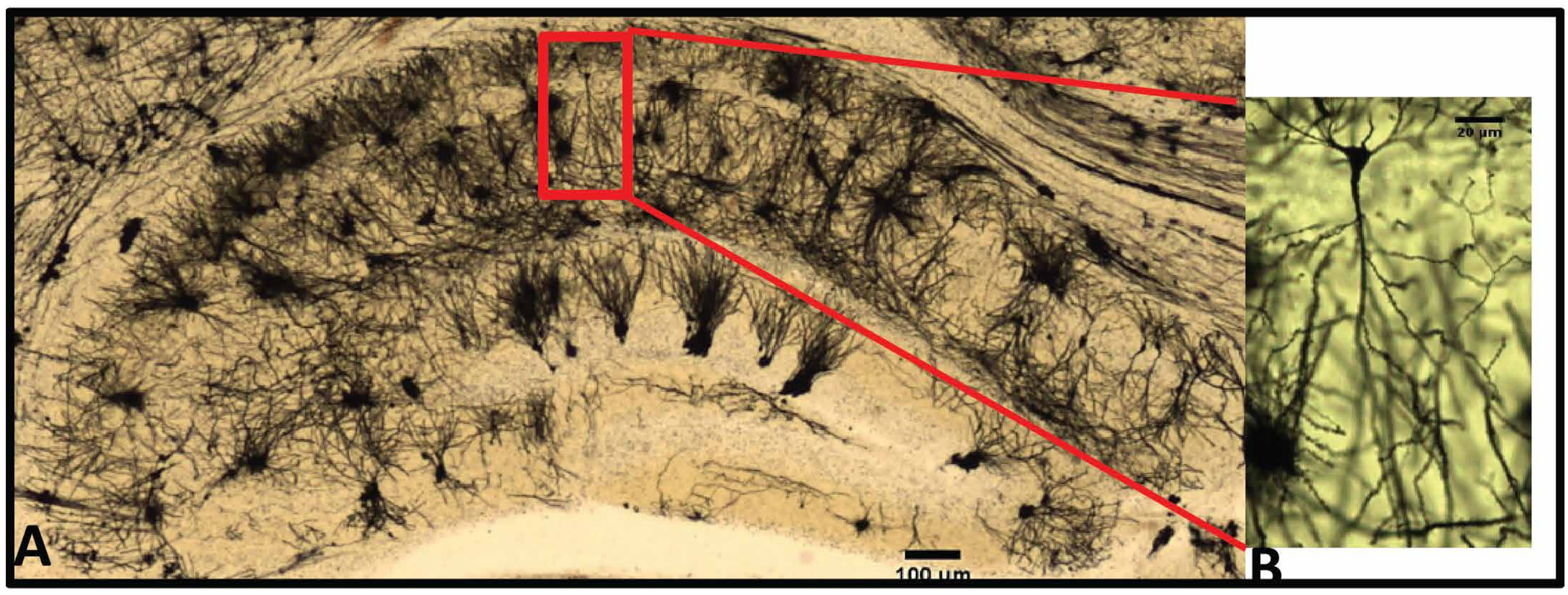
CENTRE FOR BRAIN RESEARCH (CBR)

The Centre for Brain Research (CBR) conducts cutting-edge research on healthy and pathological brain aging. Established with a generous endowment from the Pratiksha Trust, co-founded by Mr Kris Gopalakrishnan and Mrs Sudha Gopalakrishnan, CBR's mission is to discover innovative methods for early diagnosis, prevention, and effective interventions for dementia and other neurodegenerative conditions. The Centre is a dynamic hub that brings together molecular neuroscientists,

clinicians, geneticists, computational biologists, and engineers to work towards a shared goal: to minimise the burden of neurodegenerative disorders (including Alzheimer's, Parkinson's, and Vascular Dementia), thereby enhancing the quality of life of the elderly population.

For more information, please visit cbr-iisc.ac.in.



A mouse hippocampal neuron visualised by Golgi Cox staining, and a high-magnification image of CA1 neuron showing dendritic processes.

The CBR showcase at the IISc Open Day 2025 will feature:

- Its unique, large-scale, and comprehensive longitudinal studies on aging
- Poster presentations on the exciting research and innovation activities at CBR
- A display of the human brain and explanation of its functional elements
- A demo of real-time brain activity detection using EEG

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- A demo of biothesiometer, TDCS, and other clinical assessments
- Insights into fascinating concepts in human genetics
- Fun activities for children and the elderly
- A quiz competition for school children

  … and much more!

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CENTRE FOR EARTH SCIENCES (CEaS)

1. Exploring Plate Boundaries: An Experimental Approach

Experience the movement of tectonic plates through hands-on experiments demonstrating convergent, divergent, and transform boundaries. Observe how these forces shape Earth's surface and drive earthquakes.

2. Interactive Earthquake Viewer

Explore real-time earthquake data, visualize past seismic events, and simulate seismic waves to understand earthquake mechanics.

3. A Journey Through Time: Exploring Earth's History Through Rocks

Discover Earth's 4-billion-year story through rock samples and microscopic

thin sections, revealing the fascinating history of our planet.

4. Trapping Heat: The Role of CO_2 in the Greenhouse Effect

This hands-on experiment demonstrates how carbon dioxide traps heat, mimicking the greenhouse effect and its impact on global warming.

5. The Invisible Threat: An Experimental Approach to Ocean Acidification

Simulate how increased CO_2 levels lower ocean pH and affect marine life and ecosystems.

6. Reconstructing Past Climates: Foraminifera as Climate Clues

Learn how tiny marine fossils called foraminifera help scientists decode Earth's climate history by analyzing their shells for past ocean temperatures and chemistry.

7. Molten to Minerals: A Billion-Year Journey of Our Earth and Its Building Blocks

Trace Earth's transformation from a molten ball of magma to a habitable planet, shaped by geological forces over billions of years.

8. Steering the Seas: How Earth's Magnetic Field Influences Ocean Currents

Investigate how electromagnetic forces interact with moving seawater, shaping global ocean circulation.

9. Spinning Disc and Self-Generated Magnetic Fields: A Dynamo in Action!

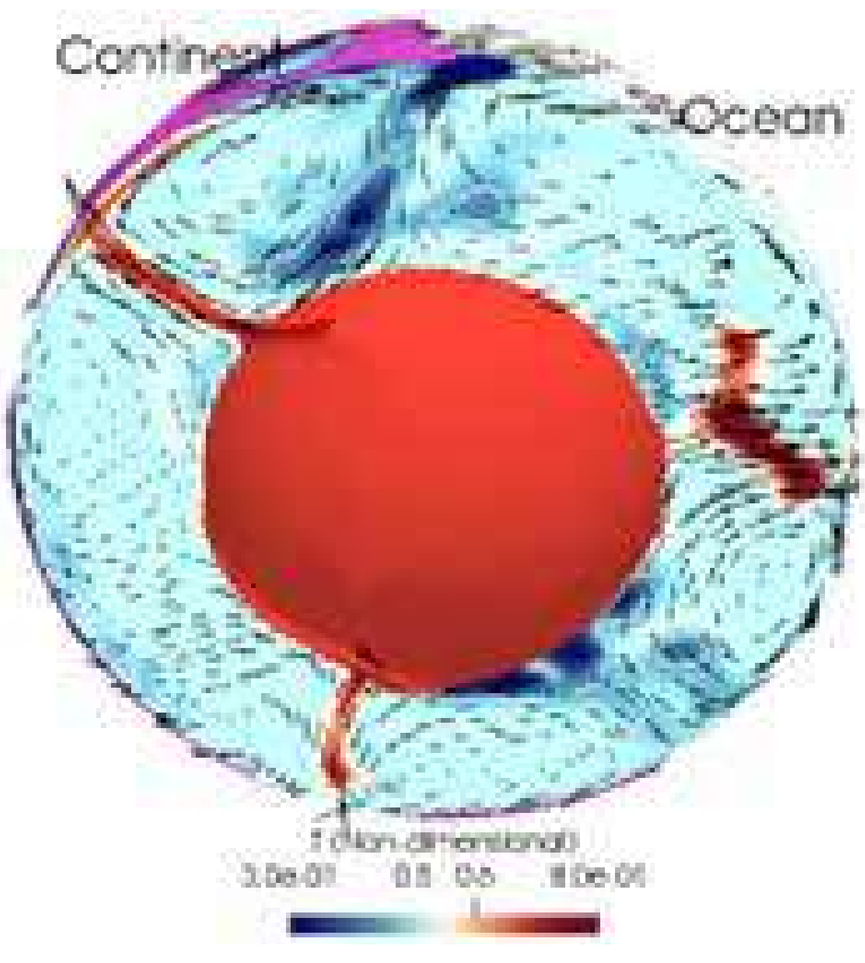
Discover how the motion of electrical conductors generates electricity and magnetic fields, simulating the principles behind Earth's magnetic field. This hands-on experiment demonstrates the dynamo effect, where motion, electricity and magnetism combine to create self-sustaining fields.

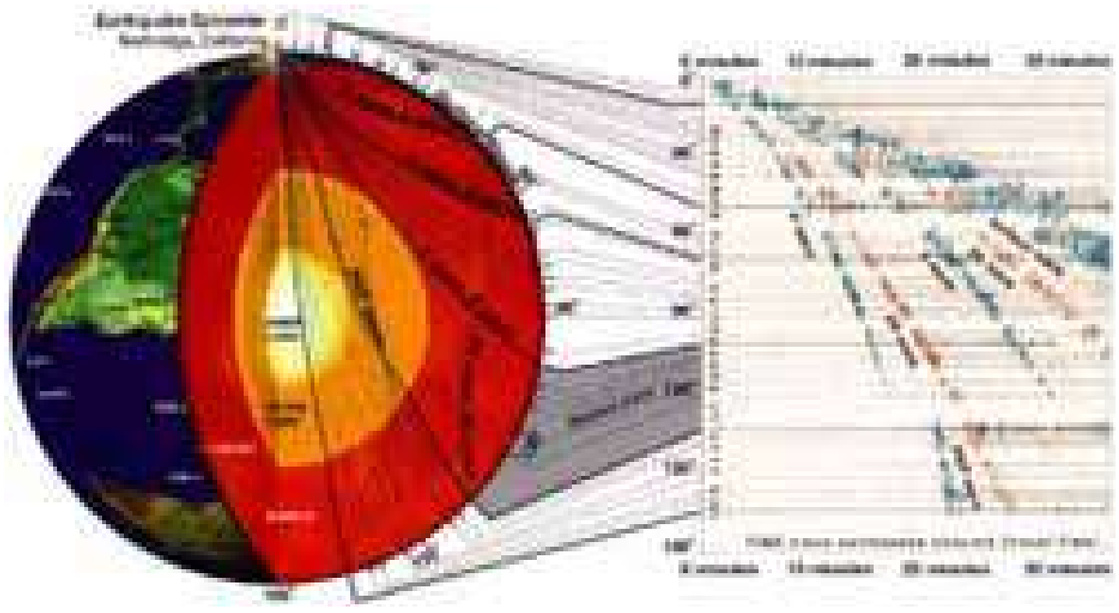
10. Earthquake waves across the globe

Watch the Planet Tremble! - Ever wondered how earthquakes shake the Earth? In this experiment, we will visualize seismic waves traveling across a globe, just like ripples on water when you drop a stone. Using an Earthquake machine model, we will detect the seismic waves and track how it's energy spreads. Watch as waves travel across continents!

11. Seismic Treasure Hunt

Discovering Hidden Secrets Underground! Imagine using invisible waves—just like superheroes with X-ray vision—to detect hidden treasures beneath the Earth's surface! By sending tiny vibrations (seismic waves) into the ground and analyzing how they travel , scientists can uncover buried objects, lost artifacts, and even underground lava caves !





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CENTRE FOR ECOLOGICAL SCIENCES (CES)

	Titles of the exhibits	Lab
1	Carbon footprint; Map the species	SB lab
2	Multi-torphic interactions	SVN Lab

3	Coagulation Chronicles, Entomo - Venomics, Know your toxins, CHYOA, Find the snakes,	KSu Lab
4	A Bird in hand is worth 2 in the bush; Beyond the Plumage; Battles over sugar	US Lab
5	Insight into the Life of Global Disease Vector; A Game of Life	KI Lab
6	Lizard bounty hunters	MT Lab
7	Selfish herding, bistable state model, fish tank	VG Lab

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CENTRE FOR HIGH ENERGY PHYSICS (CHEP)

Demos and Videos:

1. Nature of Gravity
2. Particle accelerator
3. Cloud Chamber/Geiger-Muller Counter
4. Gravitational lensing
5. Dark matter detection
6. BELLE II

Posters:

1. Introduction to Special and General Relativity

2. Black Holes, Worm Holes and Parallel Universes
3. Event Horizon Telescope
4. Dark Matter
5. Quantum Computation
6. Large Hadron Collider
7. Probing the Universe with higher energy Photons, Neutrinos and Gravitational Waves

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CENTRE FOR INFECTIOUS DISEASES RESEARCH (CIDR)

We, from **CIDR,** will be exhibiting a range of informative and interactive materials during the **Open Day**, including:

- **Posters, 3D models, videos, and formalin-preserved specimens** showcasing research on viruses and bacteria that cause infectious diseases.
- **Engaging activities** such as games, puzzles, and quizzes, are presented by CIDR staff and students to enhance public understanding of infectious diseases.

Staff and researchers from the laboratories of **Dr. Amit Singh, Dr. Shashank Tripathi,** and **Dr. Vidya Mangala Prasad**,

along with personnel from other CIDR facilities, will actively participate in these activities.

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CENTRE FOR NANOSCIENCE AND ENGINEERING (CeNSE)

Step into the fascinating world of innovation and discovery at the Centre for Nano Science and Engineering (CeNSE)! This Open Day, we invite you to explore the wonders of the nano-world and beyond through a series of interactive demonstrations designed by our scientists, engineers, and researchers. Whether you're driven by curiosity or simply looking for a memorable hands-on experience, CeNSE has something exciting in store for you.

Join us for live demos and experiments that bring cutting-edge science to life, including:

1. **How to see atoms?** – Learn how scientists visualize the tiniest building blocks of nature.
2. **How to Touch Atoms?** – Explore the tools that allow us to manipulate matter at the atomic scale.

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3. **How Do Diamonds Grow?** Discover the fascinating process of crystal formation.

4. **Dancing Rangoli:** Witness art and physics merge in a mesmerizing display.
5. **Musical Ripples:** See how sound waves create rippling patterns in liquids.

6. **Dancing Liquids / Dancing LEDs:** Sing along to see liquids and LEDs dance.
7. **Water Rainbow / Moving Rainbow:** Experience the beauty of refracted light in motion.

8. **Tiny Marvels:** Graphene Superlattices Adventures – Dive into the incredible world of graphene.
9. **EchoQuest:** Hunt for Hidden Objects – Use sound waves to detect hidden objects, just like sonar.

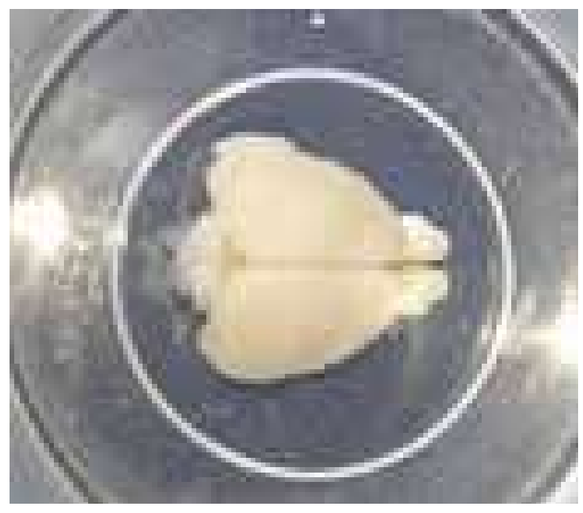
10. **Discovering Tiny Worlds:** Learn how to convert a drop of water into magnifying glass.

11. **Geno Bricks:** Explore the building blocks of genetics and biology.

12. **Brushed Up or Busted?** Breath Watcher Knows! – See how our sensors can perform breath analysis.

13. **Mixing Impossible:** I just want a drop of your blood – See how liquids behave when they must squeeze through a small tube.

14. **Brain on a Board:** Discover how circuits can mimic brain functions.



15. **Solar Car Racing:** Test your engineering skills with solar-powered vehicles.
16. **How to see what happened a billion years ago? –** come explore to figure this out.
17. **Motor Adaptation and Tactile Illusion:** Explore how the brain adapts to touch and movement.
18. **Let's Explore Our Brain!** Hands-on neuroscience activities for all ages.
19. **Flexible Solar Cells and Their World of Possibilities:** The future of bendable, lightweight solar panels.

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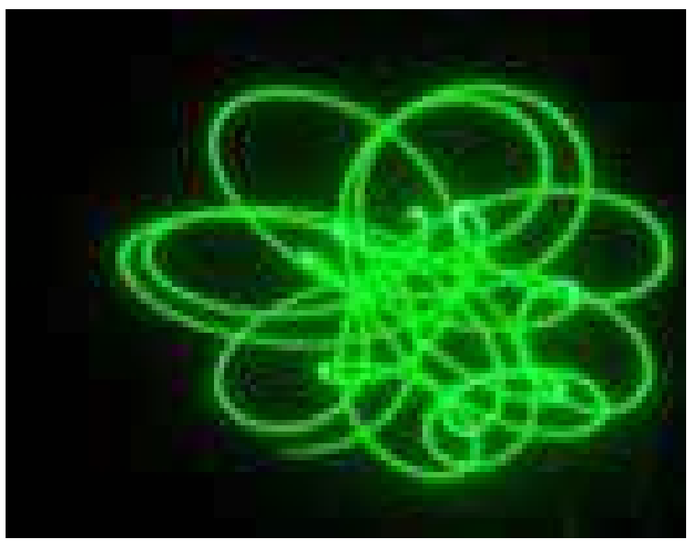
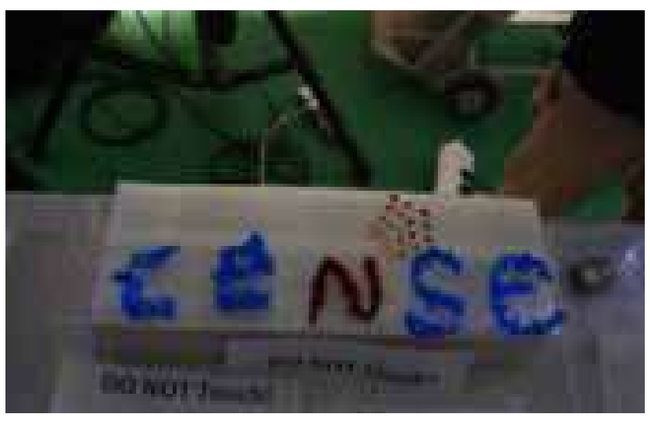
20. **Am I Seeing Right?** – Optical illusions that challenge your perception.
21. **Let's see light:** Create stunning light patterns with laser physics.
22. **Can you trap sound?** See what happens when sound gets confined into structures.
23. **Products Developed at CeNSE:** Explore cutting-edge innovations from our labs.





Join us at this year's IISc Open Day for an immersive experience, where science comes alive through engaging demos, hands-on interactions, and eye-opening discoveries.

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CENTRE FOR SOCIETY AND POLICY (CSP)

The Centre for Society and Policy (CSP) at the Indian Institute of Science, Bangalore, is an interdisciplinary research center focused on science and technology policy. Established in 2018, it explores the intersections of science & technology with

society and development. CSP addresses key policy areas, including sustainability, intellectual property, health, smart cities, livelihoods, and data security, aiming to shape policy at all stages of science and technology research.

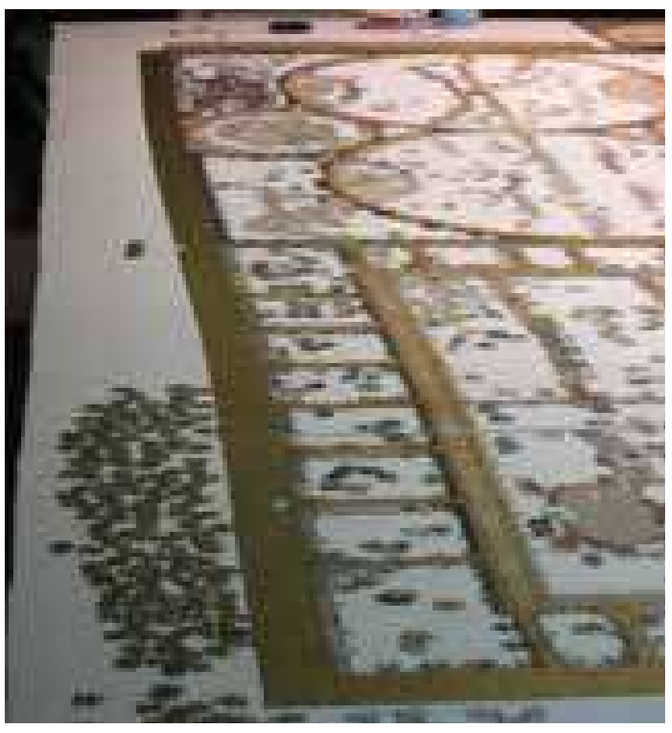
For IISc Open Day 2025, CSP has planned engaging presentations and activities. Here's a glimpse!

1. CyberFortress: Block the hack!

Delve into the mystery of cybersecurity, by piecing together a fortified defence system! Join us in this enticing adventure, to identify clues, detect common themes and solve the jigsaw puzzle.

2. Unpuzzling Utopia

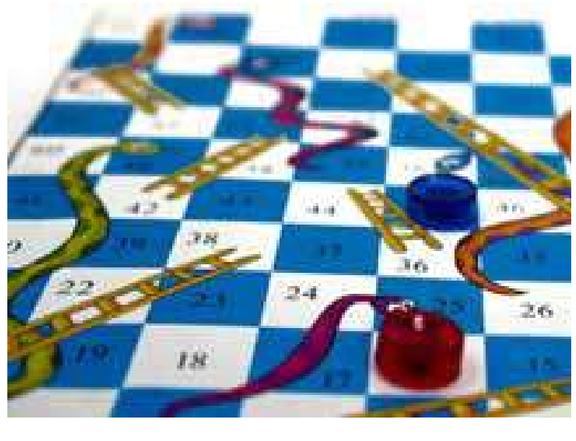
Piece together a sustainable and inclusive community! Join us in this engaging challenge to identify key elements, connect the dots, and complete the puzzle for a better tomorrow.



3. Cyber snakes and policy ladders

An innovative, interactive twist on the classic game of snakes and ladders. Players move forward or backward based on their ability

to correctly answer questions about sustainability practices, cybersecurity, power grids, and everyday economics.



4. Buzzing insights: Honeybee behavioral study demonstration

Witness live demonstrations of behavioral studies on honeybee species, including Apis cerana and Apis florea, highlighting their ecological significance.

5. Echoes of time: The story of CSP's home

Through its walls, history whispers—stories of a past that shaped the future. This video presentation explores the heritage of the CSP building and the timeless legacy of IISc.

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CHEMICAL ENGINEERING (CE)

Prof. Rahul Roy
Volunteers: Debayani (PhD), Vinay Pali (MTech)

Origami Microscope

Microscope is indispensable in biological research. We are planning to pique audiences' interest by showing the wonders

a microscope does, with a fold scope microscope and with real samples.

Prof. Narendra M Dixit

Volunteers: Nivedhitha Ulaganathan (MTech), Venu (MTech) and Shikhar Sharma (MTech)

The Magic of Chaos

The logistic map is a simple mathematical model that helps us understand how populations grow and change over time. Though it looks basic, it can show surprising and unpredictable patterns.

A small change in the growth rate can lead to big shifts in behavior, sometimes making future outcomes impossible to predict. This idea is used in ecology, disease spread, and other scientific fields to study complex systems. The logistic map is a great example of how simple rules can lead to chaos!

Prof. V Kumaran

Volunteers: Isha Mishra (PhD), Gautam Singh Majila (PhD), Anjali Mohan (MTech), Ashna Gautam (MTech),

Taylor Couette flow

Taylor-Couette flow refers to the motion of a viscous fluid confined in the gap between

two concentric cylinders that can rotate independently about their common axis. In this experiment, we will demonstrate the reversible nature of flows at very low Reynolds numbers (Re << 1) by injecting dye or food colouring into the annular region (the space between the cylinders). At such low Reynolds numbers, the flow is dominated by viscous forces, making it reversible meaning that if the direction of rotation is reversed, the dye pattern will return to its original state. Consumables required for the experiment: Glycerol, food colours and concentric cylinders setup.

Magnetorheological Fluid

Magnetorheological fluids are fluids that become more viscous when exposed to a magnetic field. MR fluids are made of tiny iron particles suspended in oil. In this experiment we will demonstrate the MR fluid's ability to transition between fluid-like and solid-like behaviour using a mixture of vegetable oil and iron fillings. Magnetorheological fluids find applications in vibration dampers, body Armor, and mechanical clutches, offering enhanced shock absorption, impact protection, and precise torque transmission in various industries such as automotive, defence, and manufacturing. Consumables

required for this experiment are available in the lab.

Prof. Sudeep Punnathanam

Volunteers: Saman Fatma (MTech), Suresh Chaudhry (MTech)

Predicting materials properties using molecular simulation

The goal of this experiment is to show how microscopic phenomena like interaction between different molecules affect the properties of the materials that we see on large scale.

Prof. Prabhu R Nott

Volunteers: Pratik (MTch), Thejus (MTech)

Flower Petals in Grains

This experiment shows how segregation of particles occurs within a dense granular medium due to rotation.

Chain Formation of Sphere

This experiment shows how particles become aligned when vibrated at a specific frequency.

Prof. Sanjeev Kumar Gupta

Volunteers: Vimal Ruhela (PhD), Prajyot Gajbhiye(MTech), Aman Kumar (MTech), Vivek Ojha (PhD)

Oscillating Color Show

Get ready for a mind-blowing experiment that will have you on the edge of your seat! Imagine mixing two clear liquids and, in just a few seconds, watching them transform into a stunning dark blue before your very eyes. But wait—this color shift happens again, like magic! Join us for the “Oscillating Color Show” and discover how science can make colors dance in the most unexpected ways! You won’t want to miss it

Balloon in bottle

Get ready for a fun, jaw-dropping science trick that will leave you amazed! In “Balloon in a Bottle,” we’ll show you how to inflate a balloon in a way you’ve never seen before—all without using your breath! Watch as we turn an ordinary bottle into a balloon-blowing machine, using just a little science and a dash of curiosity. It’s the perfect mix of magic and learning, and trust us, you’ll be talking about this one for days! Don’t miss out on the fun!

Prof. Bhushan Toley

Volunteers: Pritam Kumar Patel (PhD), Kamini Singh (MTech), Akshya Kamble (PA), and Prashant Upadhyay (MTech)

Hydraulic Powered Robotic Arm

A hydraulic-powered robotic arm uses hydraulic systems to generate and control motion. It typically consists of cylinders, pumps, and valves that work together.

Pressurised hydraulic fluid transmits force to move the arm's joints, providing strength and precision in various applications, such as manufacturing, construction, or even medical settings. The system allows for efficient lifting, manipulation, and positioning of heavy objects with flexibility and accuracy.

Prof. Ganapathy Ayappa

Volunteers: Nishant Mohan Bahuguna (PhD), Prince Kumar (MTech)

Let's Play with Molecules

We shall exhibit physical models to show various levels of interactions between and within molecules. How do these interactions lead to molecules getting together to form new phases, like water into ice? Another interesting application shall involve how

soap molecules aggregate to form micelles and exhibit cleaning action. Further, we shall present a flavor of using mathematical models like the famous Ising model to demonstrate phase segregation and phase transitions.

Prof. Ananth Govind Rajan

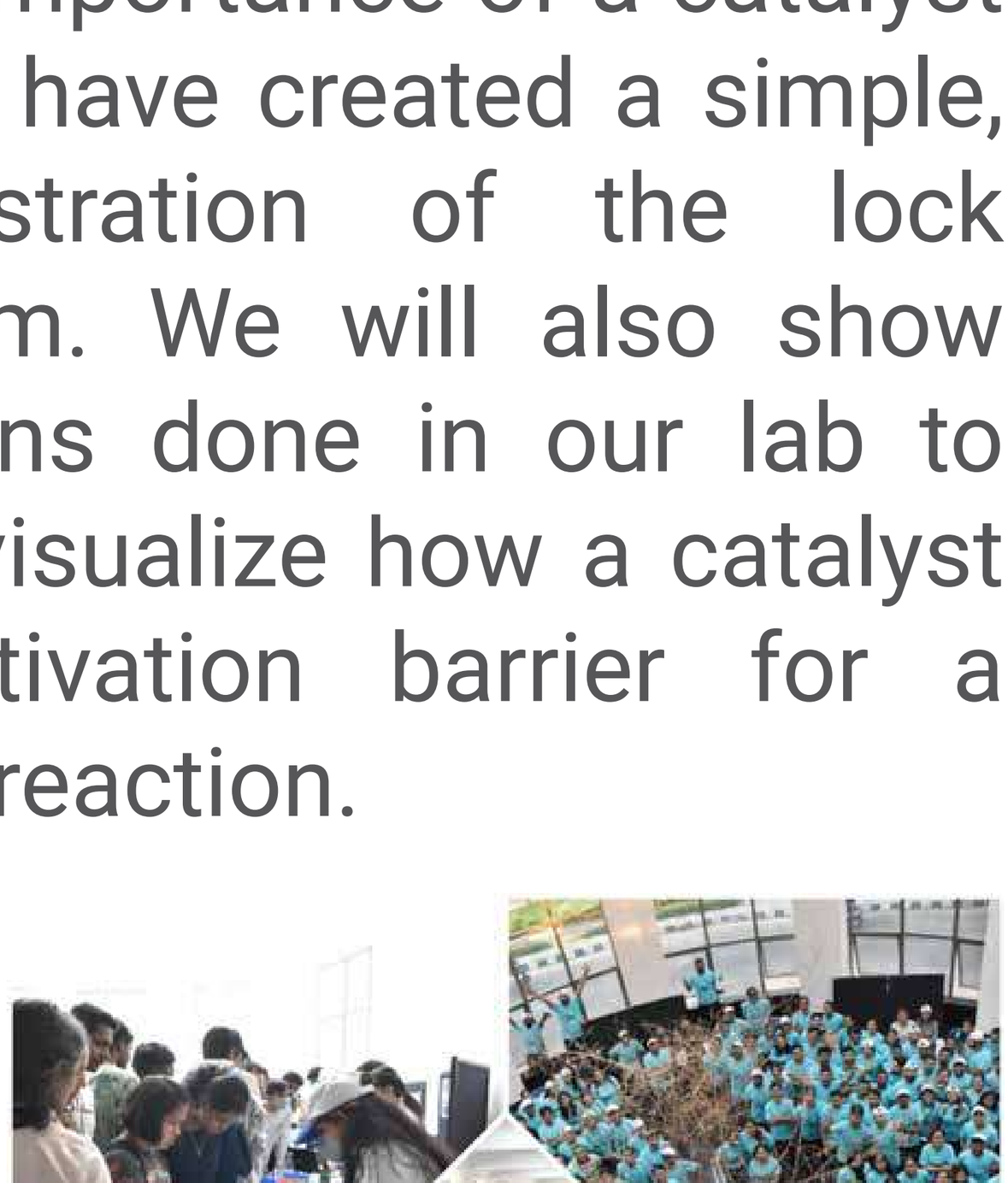
Volunteers: Pasyanthi Jampala (PhD), Shivam Chaturvedi (PhD), Aravind (MTech), Sumedh (MTech) and Abhiram (MTech)

Catalysis:

Creating a Lock and Key Model for demonstrating the importance of a catalyst and active site. We have created a simple, interactive demonstration of the lock and key mechanism. We will also show atomistic simulations done in our lab to help the audience visualize how a catalyst decreases the activation barrier for a particular chemical reaction.

Exhibitions by Chemical Science Division

Venue: Chemical Science Building



Sl. No.	Experiments

Organic Chemistry

1	Hydrogen Balloon
2	Fire on Ice
3	Fireball in hand/Gun cotton
4	Dancing Sodium
5	Thermochromism & Solvatochromism
6	Cabbage pH Color Change
7	Borax Glue
8	Chemiluminescence
9	Iodine Clock Experiment
10	Dry-Ice Experiment
11	Secret message printing

Materials Research Centre

1	Mechanical Stimuli induced reversible contrast-emission color switching of TADF compound
2	Visualization of molecular world
3	Demonstration of AI based materials property predictions
4	Elephant toothpaste and HOT ice
5	Demonstration of Photosynthesis and chlorophyll extraction
6	Blue bottle experiment and synthetic ice
7	Fuel Cell

8	Laser Security System
9	Color changing LED light
10	Graphite light bulb
11	Electrolysis of Water/ Electroplating
12	3D holographic display

Solid State and Structural Unit	
1	Invisible ink
2	Electricity from magnetic flux.
3	Coupled pendulums
4	Chemical gardening
5	Lava Lamp
6	Non Newtonian Fluid
7	Monochromator

Inorganic and Physical Chemistry	
1	Colour Chromatograph
2	Hot Ice and Chemical Tree
3	Logical Operations
4	Capacitive Touch Sensor (Demonstration for Mobile Touch Screen)
5	A simple photocell to demonstrate solar energy using house hold ingredient
6	Optical illusion
7	Electric fan Regulator
8	Electrochemical Series Demonstration via Galvanic Cell

9	Chemistry of intermolecular forces
10	Fluorescence experiment
11	Fun with polymers
17	Hydrogels
13	Fotina Fontosmata (Ghostly light)
16	Magic pencil
14	Lava Lamp
15	Chemical Chameleon
12	Fake blood Experiment
18	Chemical traffic light and Gold rain
19	Model showing Quantum and classical difference
20	Electrical connection
21	Redox Chemistry on Metal Ribbons
22	Electrolysis of Water

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CIVIL ENGINEERING (CiE)

Celebrating 75 years of excellence, the Civil Engineering Department at the Indian Institute of Science (IISc) stands as a testament to a rich legacy of academic expertise and impactful contributions. Established in 1950, the department has played a pivotal role in shaping the infrastructure landscape of India and beyond. Over the decades, it has consistently

produced visionary engineers, researchers, and leaders who have made significant advancements in areas such as structural engineering, geotechnical engineering, transportation, water resource and environmental engineering.

1. Structural Engineering

The Structural Engineering division is dedicated to research and academic activities, with a focus on computational and experimental mechanics, material and structural failures, uncertainty modeling in structural systems, and developing low-carbon performance-engineered infrastructure materials. As a part of Open Day events, we showcase various lab experiments and small models to illustrate the fundamental principles of structural engineering. Additionally, we organize engaging science games, interactive events and poster exhibition highlighting our ongoing research activities. Our lab demonstrations cover structural dynamics experiments, including shake table and real time substructure testing (RTS), fatigue experiments with an Acoustic Emission (AE) monitoring system, biaxial testing, non-destructive tests (NDT) on concrete, and a working demonstration of the Universal Testing Machine (UTM).

2. Water Resources and Environmental Engineering

The division engages in state-of-the-art and advanced research on water and environmental science. Main highlights of the prospective research exhibition:

- Application of Satellite and Ground-based Remote Sensing in measuring water, soil, forest, and agricultural yield.
- Advanced statistical methods for Hydrologic and Hydraulic safety of critical infrastructure like dams.
- Regional-scale modeling of surface and subsurface water using ground observations and physical models.
- Improving the efficiency of Urban drinking water supply using network optimization and chemical interventions.
- Capacity building on Dam Rehabilitation and Improvement in India.
- Engaging demonstrations on fluid mechanics and technical interventions in water resource management await wonderers.
- Smart Water Laboratory for real-time simulation of urban water supply.
- Water level Sensing and Flood Alarm System for early warning of floods.

Additionally, interactive games and hands-on activities will educate children about water conservation in a fun and memorable way. By combining education with engagement, the event aims to inspire attendees of all ages to recognize the importance of managing and protecting our vital water resources.

3. Transportation Systems Engineering (already updated for 2025)

- The IISc Sustainable Transportation Lab (IST Lab) is dedicated to fostering vibrant and sustainable communities by redefining urban transportation planning, policy, and intelligent systems.
  This Open Day provides an exciting opportunity to explore how scientific tools like simulations, modeling, and data analysis address pressing societal challenges, such as sustainable mobility, climate mitigation, road safety, disaster resilience, and enhancing quality of life through improved transportation systems.

As IST Lab commemorates its 15th anniversary, it proudly showcases its groundbreaking contributions to sustainable urban mobility. Highlights include landmark studies such as crowd risk behaviour during the Kumbh Mela,

collaborative projects like CLIMATRANS, and transformative initiatives such as the pedestrianization of Bengaluru's Church Street. These efforts have significantly shaped discussions on creating smarter, greener cities.

Visitors will have the chance to engage with dynamic exhibits that showcase the lab's innovative studies, cutting-edge simulations, and real-world applications in transport and traffic planning. Technology demonstrations will highlight the lab's pioneering work, revealing how research translates into impactful solutions for urban challenges. Some demonstrations will be featured from the Center of Excellence for Active Mobility (CoE-AM) and the Green Urban Mobility Innovation Living Lab (GuMILL), two important initiatives led by the IST Lab.

Adding a fun and interactive element, the Open Day will feature quizzes and engaging activities designed for children, complete with exciting prizes. These initiatives aim to inspire the next generation to think creatively about sustainable transportation.

- The Transportation Engineering division will also feature a range of activities

designed to understand the mechanics and chemistry of asphalt materials. Attendees can view various posters that highlight the challenges in engineering asphalt pavements and suggest potential solutions. Additionally, the event will include quizzes and exciting games with prizes that will demonstrate the core principles of engineering asphalt pavements, catering to audiences of all ages.

4. Geotechnical Engineering

Visits and demonstrations of high-tech laboratory equipment for soil and rock testing such as cyclic simple shear. Additionally, demonstrations of field-testing tools used for geophysical investigations such as seismometer and ground-penetrating radar.

Special attraction

a. Explore Earth and Hut: Identify Urban Unknowns Using Electro Magnetic Method of GPR- Explore Hidden Items of Dummy Bom, Metal Box with & without Pack of Eatables and Trash- Check your skill and hunt for prizes and eatables

Venue *– Test Site Opposite to Civil Engineering*

b. Mock and Pack: Densify your brain with a new Minimum and Maximum Density packing system. Explanation on Particle Packing and Relative density – Fun game with prizes given for identifying the best gradation

Time: *9.30 to 4.30 with 1 Hour Intervals*

c. 3D printing of geosynthetic material for improving stability of many geotechnical structures.

Venue *- Ground floor of Annex building*

d. Learn about building a shake table from scratch using motors and Arduinos.

Venue *- Ground floor of Annex building*

5. Activities at Fun Zone

There will be an exhibition in the fun game for kids & students to explain complex geotechnical problems with simple and interactive experiments. Demonstration of liquefaction, quicksand, active and passive soil failure etc.

We'll have engaging games and quizzes designed to explain the asphalt materials used in road construction. It's a fun way to learn about engineering while having a great time.

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CENTRE FOR NEUROSCIENCES (CNS)

Understanding the brain is one of the significant open challenges in science today. Researchers at the Centre for Neuroscience use diverse approaches to study the brain at different levels of organization using molecular, cellular, systems, cognitive, and computational approaches. We have put together exciting demonstrations and engaging posters on a variety of topics.

- **Ask a Neuroscientist:** Drop by to ask everything you always wanted to know about brains but were afraid to ask!
- **Attention in your brain:** Learn how attention shapes your eye movements and spell words with a Brain-Machine-Interface.
- **A Worm's World:** Live demonstration of nematode worm locomotion and the mechanism behind it.
- **Emotional and non-emotional conflict:** Happy or Scared? How does our brain resolve such conflicts?
- **EMG based BMI:** Activating someone else's nerve by contracting your forearm muscle using TENS (transcutaneous electrical nerve stimulator).
- **Face perception and face blindness:** Do you know anyone who is face blind?

Want to know more about face perception? Come learn about face blindness and test out your face recognition skills!

- **Human Brain Demo:** Come check out a real Human Brain from the NIMHANS human brain bank!
- **Learning by trial-and-error:** Understand how your brain learns complex skills using simple yes/no feedback.
- **Live electrophysiological recording:** see how neurons in a cockroach leg respond to stimuli.
- **Live demo of fNIRS:** Tracking brain activity as you think, remember and solve. As we shine light (quite literally!) through your skull you will get to see how your brain engages its neurons and utilizes the energy it has as you solve problems!
- **Live Neurofeedback:** Control your brain waves using auditory feedback.
- **Memory Game:** How good is your memory? Come and witness how information overload interferes with your memory. How good is good enough? Learn about how the brain differentiates similar information. Do false memories exist - the power of suggestion and limits of our memory.
- **Mind Reading:** Can you guess what someone is experiencing by looking

at their brain scans (and deep learning models)?

- **Neurotoons:** Icey chill and Fiery blaze: Science behind the duality of sensory experience, and a visual narration of core concepts of Neuroscience.
- **Pain circuits:** Gate Control Groove: Let's understand how your brain gatekeeps pain!
- **Sensation, perception, action!** Can one sense influence another? Yes/ maybe/no - we will find out.
- **Tweaking your brain:** How to change your behavior with magnetic brain stimulation.
- **Visual Illusions:** Come learn why there's more to vision than meets the eye!

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CENTRE FOR SUSTAINABLE TECHNOLOGIES (CST)

1. Plasma ball
2. Gliding arc reactor
3. Plasma-activated water machine
4. Application of End of Life Photovoltaic (EoL PV) panels as building materials
5. Greywater treatment for water recycling
6. Wastewater treatment and emerging contaminants
7. Fertilizer recovery from wastewater

8. Recirculating aquaculture system
9. Homemade water bottle tap
10. Vacuum candle
11. Adsorption
12. 3D concrete printing
13. Cement-less materials
14. Low-carbon brick construction
15. Catalytic Conversion: Biomass to Value-Added Products through various processes
16. From Biomass to Innovation: Catalytic Reactors
17. Harnessing Light: Photocatalytic Reactions model setup
18. Fat Layers & Magic Mixing
19. Secret pH Messages
20. Heat in Action: Moving & Crystallizing
21. Erupting Colors: Volcano & Traffic Light
22. Glowing Chemistry & Colorful Reactions
23. Zero electricity water pumping system

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COMBUSTION, GASIFICATION AND PROPULSION LABORATORY (CGPL)

CGPL Lab: Green Hydrogen and Green Energy Facility

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COMPUTER SCIENCE AND AUTOMATION (CSA)

Technical Events	What your event is about?
OpenHack	OpenHACK aims to bring together aspiring developers, designers, and innovators from all over India to collaboratively tackle real-world challenges through AI/ ML. Conducted in various stages, online then final stage on Open Day (offline)
CodeFiesta	Challenges through Competitive programming
Shatterpoints	Find the flags hidden across the website. (Catch the flag)
Puzzle Corner	This event will have different kinds of puzzle and interactive games. We will be switching games every90 minutes and some games will be running throughout the event

Human vs AI	Play against trained RL models via games like tic tac toe
Quizzinga	Quiz games for kids
Quizzes	
Logo Quiz	Every other hour a quiz, of identifying to which popular brand/company the logos belongs to, will be conducted on Kahoot
Quiz'O Clock (Android Versions Test/)	Quiz on CS fundamentals will be conducted on Kahoot at interval of 2 hours

Games and other Events	
Mathventures	It is a math-based version of snakes and ladders. Players roll a dice to move forward, When player encounters some grids marked with question mark then they have to solve simple math problems, accordingly they can move. Landing on a cross square eliminates the player from the game

Dart Master	Dart Game
Keyboard Clash	Typing Competition - whoever has the highest WPM wins
Fitness Comp	2-3 Levels of fitness challenges - squats, pushups, etc. Whoever finishes the last level wins
Photo Competition	Click the photo of “What you liked in IISc Open Day”, tag us. Winner accounced at 5pm
Drawing Comp	Drawing Competition
Talks	
Educonnect	GATE counselling talk
Other Talks	3 Keynotes - Prof. Anant Raj, Prof. Uday Reddy & M Bharat Kumar
Lab Demos	Demonstrations from 10 Labs

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DESIGN AND MANUFACTURING (DM)

- Inauguration of project exhibition
- Research Projects
- M.Des Projects

- M.Tech Projects
- Industry interactions
- Hands on activities for school students

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ELECTRICAL COMMUNICATION ENGINEERING (ECE)

List of Events from ECE - Open Day 2025

1. **Open source - 5G Testbed**

   The demo will comprise of:

   a. History of mobile communication - from 2G through 5G
   b. What's the goal of Open-sourcing 5G stack
   c. Demo of audio/video streaming over 5G Network
   d. For young enthusiasts, more discussions on their career interests

2. **Object Localization using MIMO RADAR**

   The MIMO millimeter-wave RADAR can be used to determine the coordinates, Doppler speed, and range of an object placed in front of it. As a result, it is a candidate technology for advanced driver assistance system and tank level monitoring.

3. **Laser Games**

   On 8X8 cross board there will be laser source at the corner and by using mirror and beam splitter need to hit objects

4. **Basic Optics**

   Demos on lenses, prism, refraction, diffraction

5. **Schrödinger Cat**

   Illustrating superposition theorem, describing the probabilistic nature of quantum system

6. **Correcting Chaos:** A Game of Error Games:
   a. 1: single bit error correction
   b. 2: 5 playing cards magic (based on probability)
   c. 3: making QR codes using beads

7. **IEEE IISc Student Branch events**

8. **Smart Home Enabled by Radar**

   Radar-based sensors can be used to perceive human presence, fall detection, etc., which can enable smart home solutions maintaining privacy.

9. **Fun experiments with laser**

   Laser light patterns, sound visualisation with lasers, laser diffraction patterns

10. **Fourier Game**

    A game which explains Fourier representation of signals.

11. **Covid 19 Simulator**

    A Demonstration of Covid 19 Simulator

12. **Polarization encoding and decoding for Quantum communication**
    Encode polarization at the Alice side using polarizer and decode it at the bob end using same orientation of polarizer.

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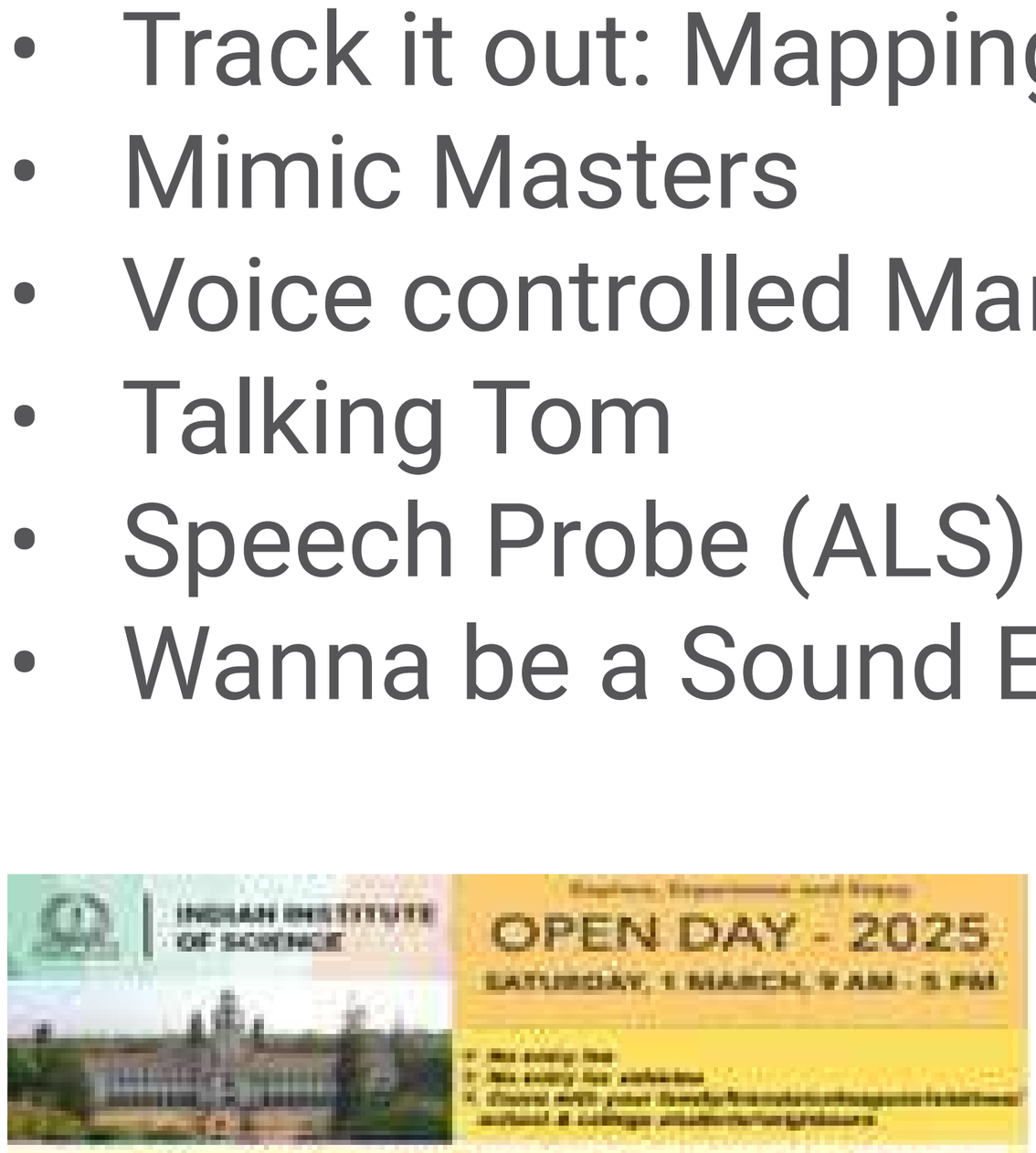
ELECTRICAL ENGINEERING (EE)

List of Demos from SPIRE Lab

- Think before you stress!
- Lazer Audio Spy
- Formbot
- Speech Hurdle
- Track it out: Mapping the Vocal Tract
- Mimic Masters
- Voice controlled Mario Game
- Talking Tom
- Speech Probe (ALS)
- Wanna be a Sound Engineer



OPEN DAY 2025 | IISc

Image Analysis and Computer Vision Laboratory

Faculty: Prof. Sumit Biswas

Room No: C231

Department of Electrical Engineering

Indian Institute of Science, Bangalore

Class-Incremental Learning

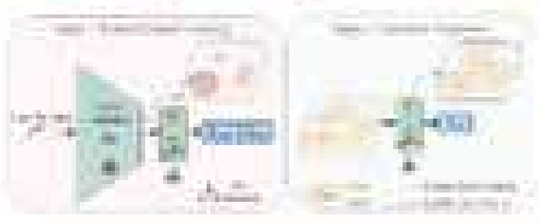
About us...

We work on a variety of exciting Computer Vision problems like

- Class-Incremental Learning
- Domain Generalization
- Test-Time Adaptation
- Novelty Detection
- Multimodal Learning

Domain Adaptation

Long-Tail Class-Incremental Learning

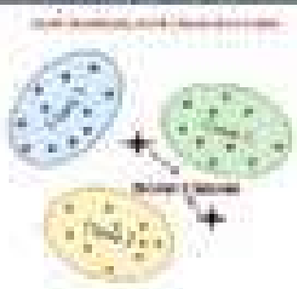


Multimodal Learning

Test-Time Adaptation

Few-Shot Class-Incremental Learning

Novelty Detection



Zero-Shot Domain Generalization

IISc Open Day

1st March 2025

State-of-art Electric Grid in a Lab!

FIST LAB, GROUND FLOOR, C123/124,

Digital Sub-station

Synchronous Generator

Generator Control Systems

Control Room

Transmission Line

Explore, Experience, Enjoy

Live Experiments | Demos | Exhibits

IISc | Open Day 2025

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ELECTRONIC SYSTEMS ENGINEERING (DESE)

DEMO LIST:

1. Indigenous fabrication of flexible neural implants Description: These indigenous fabricated flexible neural implants can be used to treat Parkinson’s disease in rat models.
2. Optical modality for breast cancer tumor delineation Description: This research develops a cost-effective Elastic Scattering Spectroscopy (ESS)-based probe to assist surgeons in accurately diagnosing breast cancer during surgery.
3. Cytology scanner for oral cancer screening Description: An affordable and portable miniaturized version of a slide scanner for automated scanning and digitization of pathological slides.
4. Vein visualizer Description: The Vein Visualizer uses Near-Infrared (NIR) imaging to enhance vein visibility, ensuring accurate and com fortable cannulation, especially for patients with difficult venous access.
5. HFIS: Handheld Fluorescence Imaging System Description: The Handheld

Fluorescence Imaging System (HFIS) uses immunofluorescence with ICG dye to enhance surgical precision by visualizing blood flow, tissue perfusion, and cancer spread in real time.

6. QCM for liver cirrhosis screening
   Description: A QCM-based electronic nose (E-nose) detects VOCs in biological samples for non-invasive disease screening using sensor frequency shifts and pattern recognition algorithms.

7. Electrical Impedance-based Multiplexed Biosensor for Point-of-Care Diagnosis
   Description: This project develops a cost-effective, impedance-based biosensor for simultaneous multiple analyte detection, enabling scalable, reusable, and precise diagnostics for medical and industrial applications.

8. Headband for hearing screening
   Description: This innovative system automates the extraction of EEG signals related to hearing, using a custom headband with three strategically placed electrodes for large-scale adult hearing screening.

9. Polarization-based Optical system for Heart Tissue Characterization
   Description: This optical system enables

real-time, precise characterization of healthy and fibrotic myocardial tissues, improving cardiac diagnosis and patient outcomes.

10. Gesture recognition using ToF:
    Description: ToF sensors use IR for precise, touchless control in Passenger Service Units (PSUs), enhancing accessibility, privacy, and user comfort.

11. Haptic navigation: Description:
    This project explores haptic feedback integration in wearable and cabin devices to enhance airplane wayfinding, improving accessibility and passenger experience.

12. Digital yoga master: Description: A personal yoga master device that digitally tracks posture and breathing in real time, ensuring accurate monitoring without human intervention.

13. TurtleBot based Caf´e Attendant:
    Description: An E-Server that takes and displays orders for refreshments, then collects and serves them based on the customer's choice.

14. E-Security Guard Description: The E-Security Guard project integrates facial recognition and email OTPs for secure

and efficient department access control, enabling door access via camera and microphone inputs.

15. Air Quality and Environment Monitoring Platform Description: The Air Quality and Environment Monitoring Platform uses BME280 and SPS30 sensors with a Raspberry Pi to monitor air quality and provide real-time environmental insights via the Gemini API.

16. Solving Graph Max Cut with FPGA Acceleration Description: This project leverages probabilistic computing with a 2048-node system, pc-COP, on a Xilinx UltraScale+ FPGAto efficiently solve the max-cut optimization problem.

17. Laser Labyrinth Description: The Laser Maze Game combines strategy and skill, challenging players to navigate a room of colored lasers while managing time, score, and interruptions with sensors, a timer, and a buzzer.

18. Pathfinder Description: A robotic car navigates a maze, overcoming obstacles and collecting rewards along the way to reach its goal.

19. The Digital Battlefield Description: “Understanding and Defending Against

Cyber Attacks” explores real-life cyber threats and teaches effective tools and methods for safeguarding systems.

20. Cybersecurity Project Description: The demo showcases common cybersecurity attacks and defenses, helping users identify vulnerabilities in everyday devices and understand how hackers exploit them.

21. Chess Playing Robot Description: The Automatic Chess Board with Robotic Arm uses image processing and AI to track the game and direct a robotic arm for precise moves, enhancing the gameplay experience.

22. Wireless communication inside EV Description: This project proposes using wireless communication to control vehicle peripherals like turn indicators, reducing the weight and improving efficiency compared to traditional wiring harnesses.

23. Van de graff generator Description: A demonstration of static electricity, showcasing its effects and principles

24. Drone Description: Design and development of an unmanned aerial vehicle for various applications such as surveillance, delivery, or monitoring.

25. Energy Internet Description: The Energy Internet enables real-time, bidirectional energy flow in packets across a decentralized network, similar to data transfer on the internet.

26. Range extension of EV by battery Paralleling Description: This project enhances EV driving range by optimizing power delivery and energy capacity through battery pack paralleling.

27. Urban Air Mobility (UAM) Description: A Collaborative Decision Making System (CDMS) for Urban Air Mobility.

28. Electric vehicle using Theo jansen mechanism Description: The electric vehicle with a Theo Jansen mechanism uses motor-driven mechanical legs for smooth, efficient multi-terrain mobility, ideal for exploration and transport.

29. Relationship between Space Weather and Conditions on Earth using Maxar Satellite Imagery Analysis

30. RC Plane Description: The RC plane features a back propeller design, powered by brushless DC motors, with a transmitter, receiver, ESC, and battery, all built from paper-laminated foam.

31. Brainwave Controlled Remote Controlled Car Description: The EEG headset measures brain electrical activity to control a car based on the user's attention levels.

32. Gesture Recognition using mmWave Radar Description: An AI-enabled mmWave radar uses neuromorphic signal processing and machine learning to classify gestures into push-pull, left-right, up-down, and others.

33. Neuromorphic Camera Description: The neuromorphic camera captures sparse data through contrast-based events, offering high dynamic range and temporal advantages for dynamic environments.

34. Synthetic Aperture Radar Imaging Description: This demonstration showcases Synthetic Aperture Radar (SAR) imaging with mmWave radar to generate detailed environmental images.

35. Real-time audio and video inference using RAMAN TinyML Accelerator Description: This demonstration showcases real-time audio and image classification using the RAMAN TinyMLaccelerator, optimizing edge inference with quantization and sparsity.

36. SQ-CARS: Scalable Quantum Control and Readout System Description: SQ-CARS is a scalable, phase-synchronized quantum control and readout system using the ZCU111 kit, enabling multi-qubit control with an interactive Python framework.

37. TinyML: Powering the Edge with Machine Learning Description: This demonstration showcases how TinyML enables efficient, low-latency, and privacy-preserving data pro cessing directly at the edge with minimal infrastructure.

38. TYLOR: TDC-based Low-Overhead Synthesizable Power SCA Countermeasure on FPGAs Description: TYLOR is a low-overhead, fully synthesizable circuit-level countermeasure that enhances power side-channel attack security on FPGAs using a TDC-based power compensation circuit.

39. ML-based Hardware for Gesture Recognition at the edge Description: EMG-based wearable device for real-time hand gesture recognition, validated using both public datasets and real-time sensor data.

40. Side channels attack on Snow-V
    Algorithm Description: SNOW-V is a 256-bit stream cipher for 5G security, enhancing SNOW 3G with stronger encryption and improved resistance to side-channel attacks.

41. ASIC Implementation of ambipolar gate modulation for graphene Hall-effect magnetic sensor Description: a graphene-based Hall-effect magnetic sensor with post-spinning current and ambipolar gate modulation to enhance accuracy, enabling chip-level integration for real-time automotive magnetic sensing.

42. Highly Sensitive, Low Voltage, Multinuclear Portable NMR System development. Description: A portable, low-field NMR system with an optimized signal chain and probe architecture for high-sensitivity spectral analysis in biomedical and food quality applications.

43. Development of Cesium Based Benchtop Atomic Clock Description: A prototype of ultra-stable cesium-based atomic clock using Coherent Population Tracking (CPT) resonance, featuring a benchtop optical setup and in-house electronics.

44. Electronics for DNA Nanopore

Sequencing: Detection, Amplification, and Signal Processing Description: This project utilizes solid-state nanopores for DNA sequencing, employing a high-gain, low-noise tran simpedance amplifier to accurately detect ionic current changes during DNA translocation.

45. Quantum Random Number Generator using BiCMOS Logic Description: This project utilizes BJT shot noise to develop a QRNG for secure cryptography and cybersecurity applications.

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INSTRUMENTATION AND APPLIED PHYSICS (IAP)

MONDAL LAB

1. **Laser-Activated Fluorescence: A Dynamic Color Change Demonstration (DEMO)**

   We will demonstrate how fluorescence dyes change color when exposed to specific light sources, using a hazard-free low-power laser. By illuminating different dyes with carefully selected wavelengths of light, we can observe their characteristic fluorescence, such

as green, red, and blue. This simple yet effective demonstration highlights the principle of fluorescence, where molecules absorb light at one wavelength and emit it at a longer wavelength, producing a visible color change.

2. Scanning single molecule localization microscopy (scanSMLM) for super-resolution volume imaging (Poster presentation)

   A novel microscopy technique called scanning single molecule localization microscopy (scanSMLM), which significantly enhances super-resolution volume imaging capabilities. This method improves upon traditional single molecule localization microscopy (SMLM) by employing a scanning-based approach for volume imaging, using an electrically tunable lens (ETL) for rapid axial scanning. This enables detailed visualization and analysis of cellular structures, such as actin filaments and mitochondrial networks, and the clustering of Hemagglutinin (HA) protein molecules in cells. The technique's ability to provide three- dimensional imaging at the single-molecule level offers groundbreaking insights into cellular biology and disease progression.

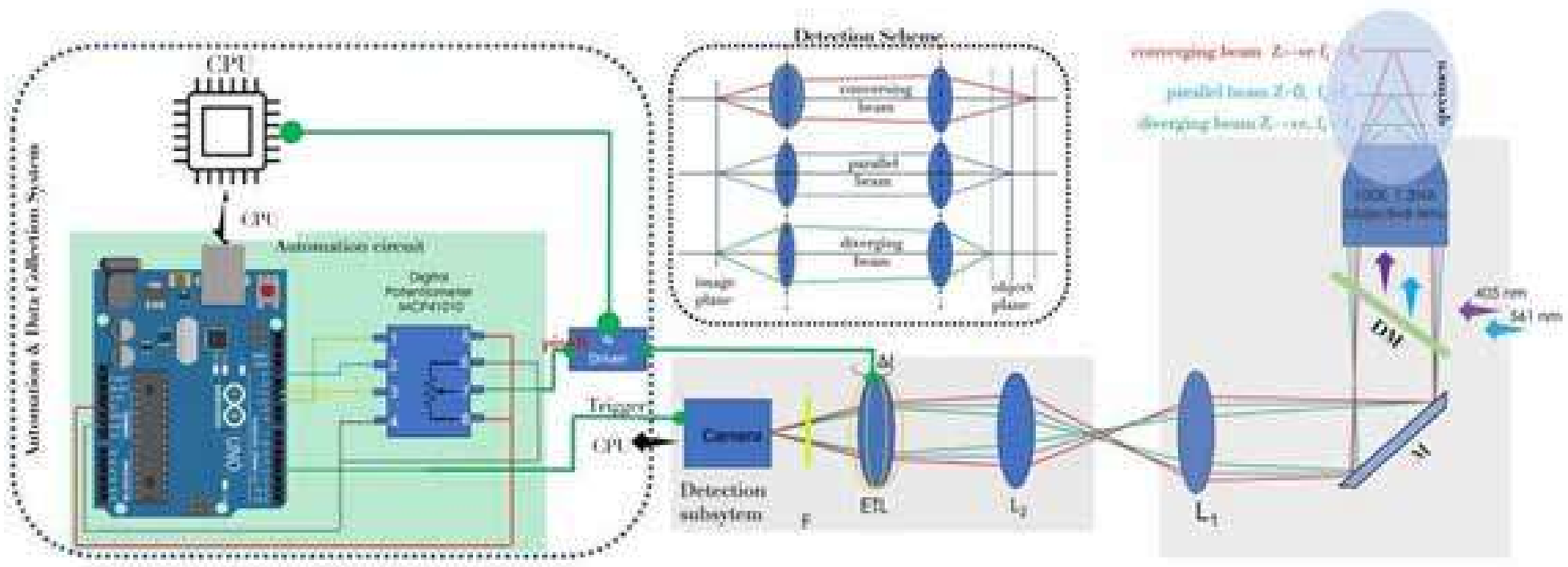

Fig 1. Schematic Diagram of the scanSMLM super-resolution microscopy

3. **<u>Fluorescence-based multifunctional light sheet imaging flow cytometry for high- throughput optical interrogation of live cells (Poster presentation)</u>**

Multifunctional imaging cytometry system (M3IC) that utilizes vertically-aligned multi- sheet array (VAMSA) illumination for high-throughput, three-dimensional imaging of live cells. This system enables detailed volume visualization and analysis of cellular organelles with high signal-to-background ratio, facilitating the study of cellular functions and drug treatment effects on cancer cells. It represents a significant advancement in the fields of fluorescence microscopy, cell biophysics, disease biology, and optical physics by providing a new tool for rapid and detailed cellular analysis.

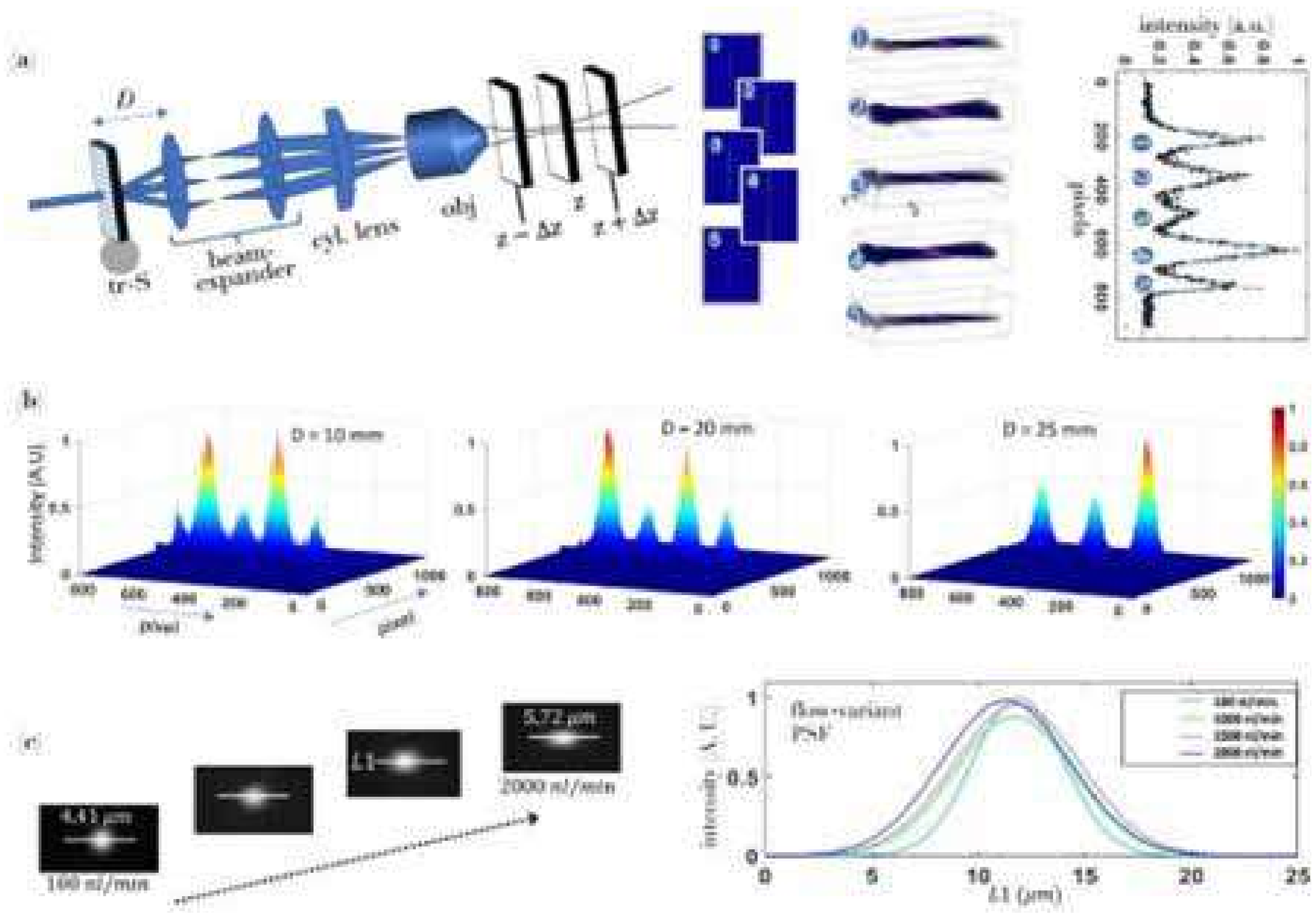

Fig 2. System point spread function characterization

Tera-QuaNTA-Lab

Advisor: Dr. Manukumara Manjappa (mmanjappa@iisc.ac.in)

Lab representatives:

Abhishek Haldar (habhishek@iisc.ac.in)
Nishant (nishant2022@iisc.ac.in)

1. Demonstrate how Lock-in works:

A lock-in amplifier is a powerful tool used to extract a signal of known frequency from a noisy environment. The demonstration will visually show how it works by taking a weak signal, often buried in noise, and using a reference signal of the same frequency to isolate it. This will involve showing how the lock-in correlates the input signal with the reference, effectively filtering out

unwanted noise and amplifying the desired signal. Practical examples could include detecting a faint light signal or measuring a small electrical resistance change, highlighting its importance in sensitive measurements across various scientific fields.

2. **Demonstrate Non-linear effect:**

   Non-linear effects occur when the output of a system is not directly proportional to its input. The demonstration will showcase how materials respond differently to strong stimuli compared to weak ones. For example, it could involve shining a high-intensity laser through a crystal and observing the generation of light at different frequencies (like second harmonic generation). This will visually explain how the material's properties change under intense fields, leading to effects like frequency doubling or tripling. This is fundamental in areas like photonics, materials science, and even biology.

3. **Model / Video to explain THz Time Domain Spectroscopy:**

   Terahertz Time-Domain Spectroscopy (THz-TDS) is a technique that uses pulses of terahertz radiation to probe

the properties of materials. The model or video will illustrate how short pulses of THz light are generated, transmitted through a sample, and detected. It will explain how the time-domain information is converted into a frequency spectrum, revealing unique vibrational and rotational properties of molecules. The demonstration will emphasize its non-destructive nature and applications in material characterization, pharmaceuticals, and security screening.

4. Model / Video of Pulsed Laser:

Pulsed lasers emit light in short bursts, rather than a continuous beam. The model or video will demonstrate how these lasers generate intense, short pulses of light using techniques like Q- switching or mode-locking. It will show how these pulses can be used to achieve extremely high peak powers, enabling applications in materials processing, laser surgery, and fundamental research. The demonstration will also highlight the difference between continuous-wave lasers and pulsed lasers, emphasizing the unique properties and applications of pulsed light.

5. Posters / Videos to show the use/ applications of THz waves:

Terahertz waves, located between microwaves and infrared light, have a wide range of applications. The posters and videos will showcase how THz radiation can penetrate various materials, making it useful for non-destructive testing, security screening (detecting concealed weapons or explosives), and medical imaging (detecting skin cancer). Itwill also highlight applications in telecommunications, environmental monitoring, and materials characterization, emphasizing the unique advantages of THz technology in various fields.

6. 6G communication:

6G communication represents the next generation of wireless technology, promising significantly higher data rates, lower latency, and increased network capacity compared to 5G. The demonstration will explain the key technologies driving 6G, such as terahertz communication, artificial intelligence, and advanced antenna systems. It will highlight the potential applications of 6G in areas like

holographic communication, immersive virtual reality, and the Internet of Everything. The aim is to convey how 6G will revolutionize communication and enable new and transformative technologies.

LANSPE Demo Project Topics

1. **4F lens system to showcase Image processing.**

   Brief description: A lens performs a Fourier transform between focal planes. In a 4F lens system, we can get access to both the Fourier plane as well as the Image plane. By introducing various aperture at the Fourier plane, we aim to showcase high and low frequency filtering of the image.

2. **Exploiting instability induced thin film surface morphologies for applications in large area soft photonics**

   Brief description: Micro and nano structures on substrates can manipulate light-matter interactions. Conventional lithographic processes used for fabricating these structures make the process expensive and non-scalable. By exploiting thin film surface

instabilities, we have achieved ordered micro-structures on substrates. We will be showcasing the diverse optical applications of these structures.

QOQI Lab

1) **Quantum Eraser:** A Quantum Eraser using a Mach-Zehnder Interferometer demonstrates how the availability of which-path information affects interference. A photon entering the interferometer splits at the first beam splitter, taking two possible paths before recombining at the second beam splitter. When the paths remain indistinguishable, an interference pattern forms at the detectors. However, introducing a which-path marker, such as polarization, destroys the interference by making the paths distinguishable. If a quantum eraser, like a polarizer or additional beam splitter, removes this distinguishing information, the interference pattern reappears, showing that the mere potential to obtain which-path information determines the outcome, not just the physical setup.

2) **Michelson Interferometry:** We demonstrate a Michelson interferometer-based experiment to measure the

refractive index or thickness of an arbitrary object. In a standard Michelson interferometer, the fringe pattern shifts if there is a mismatch in the optical path length. By counting the number of fringes that disappear when an object is introduced, we can determine the thickness of the material if its refractive index is known. Conversely, if the thickness is known, the refractive index can be calculated.

For 1) and 2) description will be given on a single poster. And for this demonstration two table.

3) **Lab Overview:** For our lab work, we demonstrate quantum teleportation, showing how a quantum state of dimension two, or a qubit, can be transmitted from one location to another using shared entanglement, without physically transferring the system itself.

For 3) we will have one poster.

NanoSTech Lab:

Title: Quantum Dots: Tiny Particles, Big Possibilities
Description: Quantum dots are nanoscale semiconductor particles that are

revolutionizing technology with their unique optical and electronic properties. Their color depends on their size, making them highly tunable for a wide range of applications. From vibrant QLED displays and efficient solar cells to groundbreaking advances in medical imaging and quantum computing, quantum dots are paving the way for a brighter future. Join us to explore the science behind these tiny wonders, their real-world applications, and the exciting possibilities they hold for the future of technology and innovation. Don’t miss this chance to dive into the quantum realm!

FIST Lab:

Optical fluence demonstration in biological tissue

This demonstration will showcase the principles of optical fluence in biological tissue using agar phantom models. We will explore how photoacoustics can overcome the limitations of traditional optical imaging and ultrasound by providing deeper penetration and higher contrast.

FBG Lab

Demo1- FBG Hydrophone

Underwater pressure acoustic sensor with a Bragg grated optical fibre as the core sensing element is fabricated with simple

cylindrical sidehole structure. The sensor contains no electronic component or any current carrying element.

In this demonstration, acoustic waves are generated in a watertank and the signal is received by a FBG Hydrophone made in our lab.

Demo2- FBG Pulse Measuring Device

A chemically and electrically inert radial pulse measuring device, fabricated using Fiber Bragg Grated sensor is demonstrated.

The sensor is used to obtain the real time systolic and diastolic blood pressure utilising a standard non-invasive sensor.

NANOSCALE DEVICES LABORATORY

Lab Poster, Demo, and Exhibition

Poster:
Title: Study of Van der Waals Heterostructures Using Electron Transport Method

Description: Our study focuses on the fabrication and electronic characterization of Van der Waals heterostructures composed of 2D materials such as graphene, h-BN, $MoSe_2$, and WSe_2. These heterostructures are assembled using deterministic stacking techniques

and analysed via electron transport measurements to explore their unique physical properties and potential applications in next-generation electronic devices.

Demo:
Title: Moiré Pattern Visualization

Description: This demonstration illustrates the formation of moiré patterns using thin plastic films with printed periodic patterns. By layering and rotating these films, visitors can observe the interference effects that play a crucial role in understanding the electronic properties of twisted bilayer graphene and other 2D material systems.

Exhibition:

1. Plasma Ball – Understanding Plasma and Electric Fields

Science Behind It:

A plasma ball consists of a glass sphere filled with inert gases at low pressure. When a high-frequency alternating voltage is applied to an electrode at the centre, the gases ionize, forming glowing plasma filaments that extend toward the glass. When a person touches the surface, their body acts as a conductor, influencing the

electric field and attracting the plasma filaments.

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2. Hologram Display – Optical Illusion Using Acrylic Glass

Science Behind It:

This exhibit demonstrates the principles of holography and light diffraction using a simple 3D hologram projector made from acrylic glass. When light from a smartphone or projector interacts with the angled acrylic surfaces, it creates a virtual floating image that appears three-dimensional. The effect is achieved through light reflection and refraction, like how real holograms work.

FUN ZONE

Fun in Science & Speed Mentoring

Science is best understood when it pushes our limits and challenges our thinking. This event features a series of exciting games designed to test your scientific curiosity, knowledge, skills, and intuition—are you ready to take on the challenge?

In addition to the games, our students will be available at a dedicated counter to answer your career-related questions through speed mentoring. This is a great opportunity to interact with our students, gain valuable insights, and leave with meaningful takeaways from this Open Day experience.

Rohit SWAN: *Unlock Your Future with Guided Discussion!*

Are you a student wondering what path to take after school? Or perhaps a parent seeking advice for your child's career? Interact with us as part of our *Mentorship Program* and get all your questions answered! Whether you're a high school student, a curious kid, or an adult exploring new opportunities, our team of mentors is here to guide you and together charter a plan. From choosing the right courses to discovering extracurricular activities that boost your skills, we'll help you plan a bright and successful future. Let's just discuss!

Visit us today and take the first step toward your dream career!
Let's build your tomorrow, together. 🚀

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INTERDISCIPLINARY CENTRE FOR WATER RESEARCH (ICWaR)

Vandana and Karthika:

Title: The Wall of Resilience: Mangroves, Seagrass, Coral Reef

Description: In this project, we investigate the individual and combined coastal protection services supplied by corals on reefs, seagrass meadows, and mangrove forests during both non-storm and storm conditions, also under rising sea levels. The coral reef is covered by coral colonies. Seagrass meadows generally grow shoreward of the reef, and they cover as much of the seabed as light and water quality conditions allow. Mangrove forests occupy the nearshore intertidal and coastal regions (as shown in the figure).

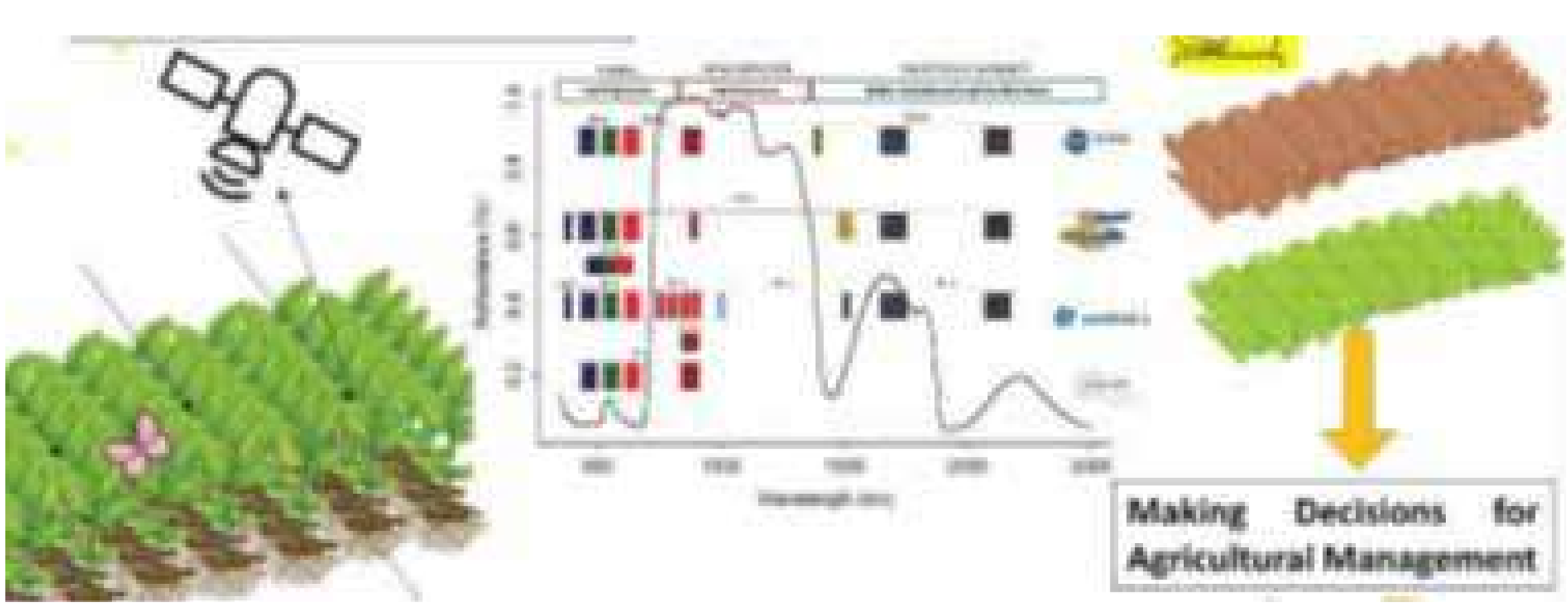
The mechanism is shown by a rectangular channel of water and sections of the three distinct habitat types, coral reefs, sea grass, and mangroves inserted to show the effect of each individually and combined in protecting the coast. A flapper powered by a DC motor is used to create waves. The

amplitude of the waves controlled by the speed of the motor, to show the impact of waves during storm and non-storm conditions. The rise in sea level showed by the increase in water level and the landward backing of mangroves.

Aayushi and Tejasveena:

Title: Working Model to demonstrate the use of the LTI system to quantify the amount of irrigated water that is used for agriculture.

Description: We will try and present the quantification of irrigation water using the LTI system. This would require capturing the reflectance by the sensors for the irrigated and barren field and showing their respective signals.



Sai Vikas Kona:

Title: Working on a Pelton turbine

Description: The idea is to demonstrate the working of a Pelton turbine using a simple but sophisticated model. We

all know that the Pelton turbine is a hydraulic turbine that can generate power with the help of energy generated from the water impulse on the rotatory blades. It will be fun to showcase a clear demonstration of the working of the Pelton Wheel.

Dr. Brahma and Maya

Title: Build a 3D model of the GRACE-satellite system revolving around the Earth Geoid.

Display:

- A 12-inch diameter 3D model of Geoid is needed – quantity – 1
- 2-inch length 3D grace satellite model – quantity – 2
- 4-inch length 3D grace satellite model – quantity – 2

Balaram Shaw and Harini

Title: Flood Bypass Tunnel: A new way to prevent floods.

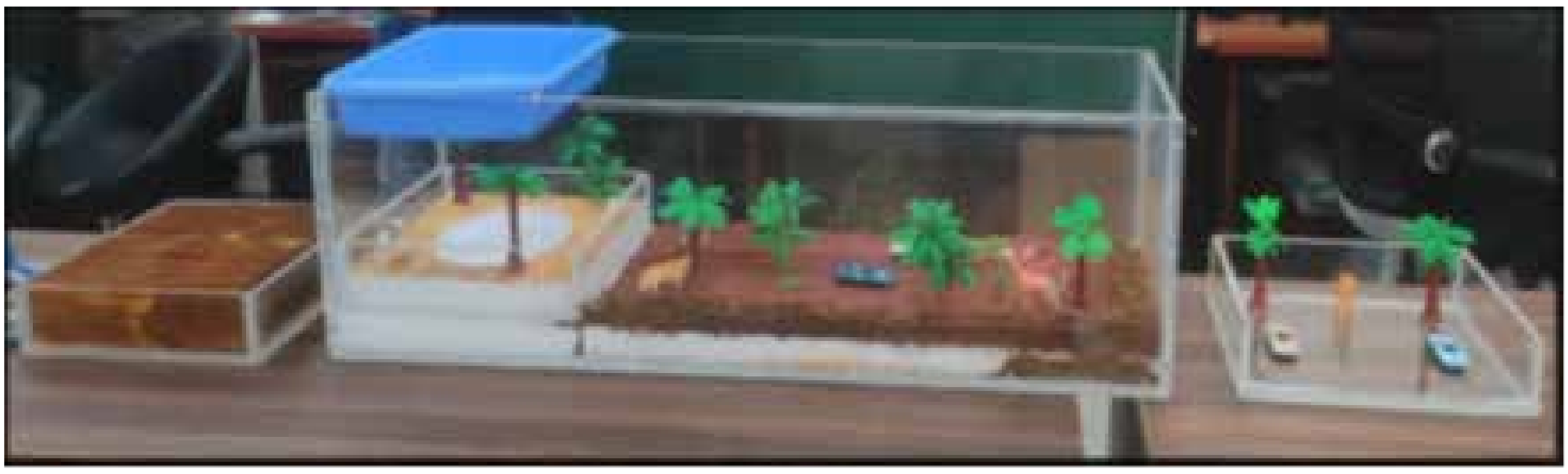
Description:
In developed areas like a fully urbanized city or business district, it has become difficult to incorporate any flood mitigation measures.

The model will demonstrate a new way to fight with flood risks and their dreadful impacts.

Balaram, Arindan and Chethan

Title: Flash Flood: Cause and Adaptation Strategy

Description: Drought to flash floods – response of rivers to rainfall - comparison of before and after Urbanization.



Title: Simple Water Level Indicator and Automatic Plant Watering System

Description: This model prepares the Automatic water level indicator from scratch i.e., using sensors. This prototype represents the actual working principle of the automatic gauging stations.

Along with this, I'm also showing an Automatic water irrigation system i.e., how you can make your own Automated Water Irrigation System for your small Garden or any Potted Plant using a simple Arduino UNO Board, a Soil Sensor, and a 5 Volt Relay Module.

Yuji Shigefuji

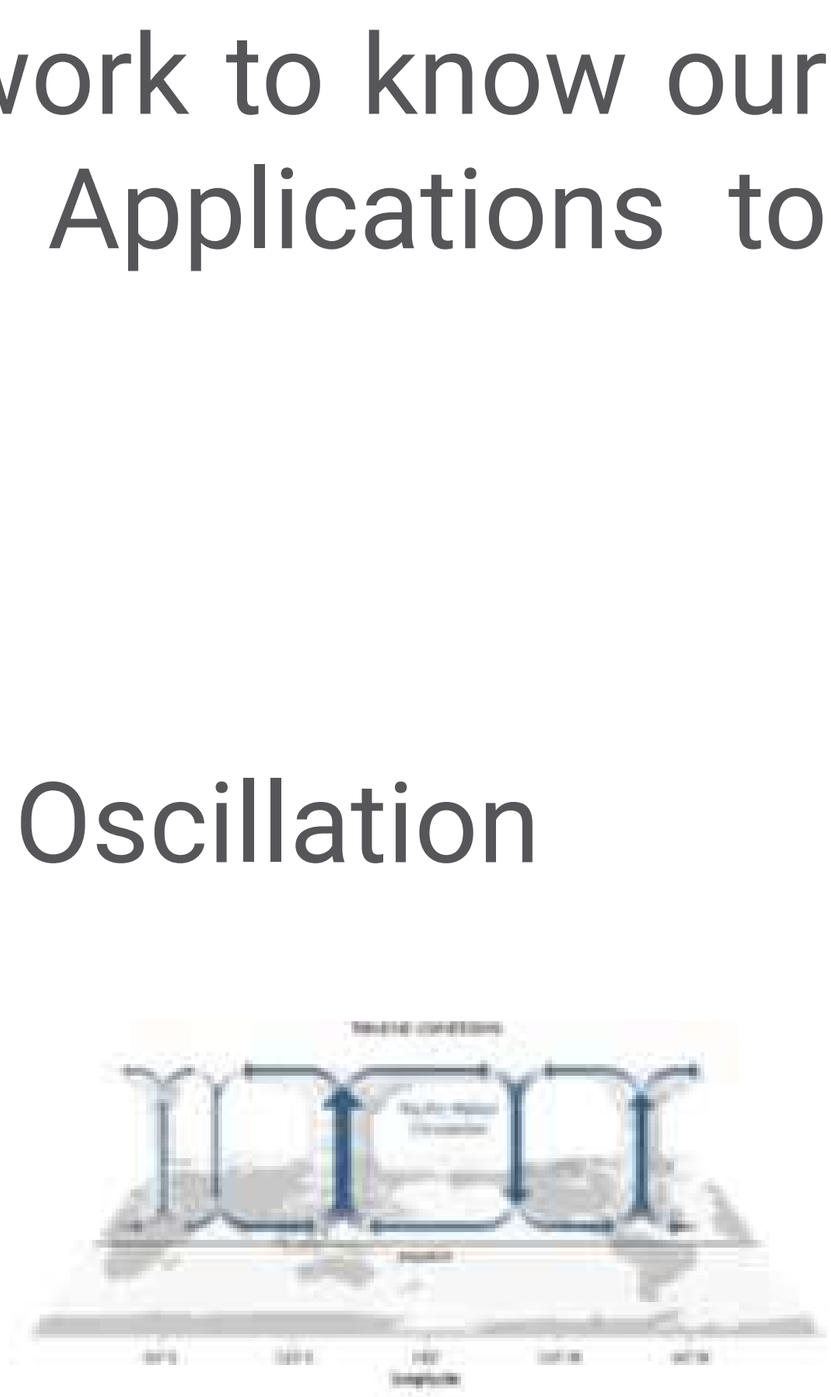
Title: Demonstrating low-cost IoT sensors.

Description: How does it work to know our environment in daily life? Applications to hydrological research.

Poornima

Title: El Niño and Southern Oscillation

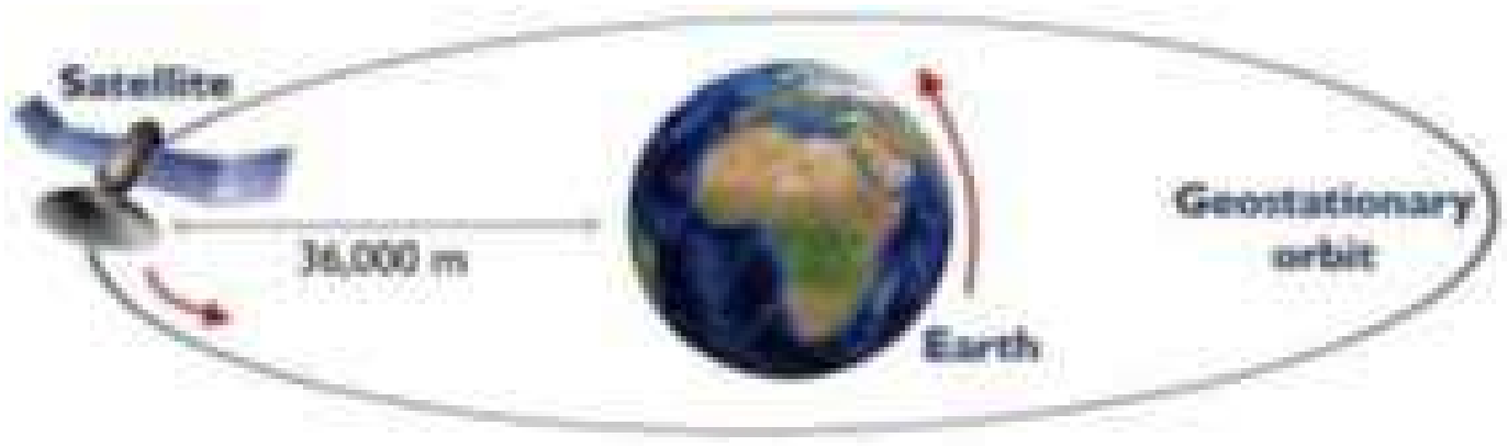
Description: El Niño and La Niña are opposite phases of a natural climate pattern across the tropical Pacific Ocean that swings back and forth every 3-7 years on average. Together, they are called ENSO (pronounced "en-so"), which is short for El Niño-Southern Oscillation.



Retinder Kour

Title: 3D visualization of orbital revolution of satellites

Description: A physical replica of the globe and satellites will be created using 3D prints, based on .stl files, providing a concrete visualization. AC motors will drive the rotation of the globe and satellites. Finally, an acrylic casing will enclose the 3D model.



Shairik Sengupta

Title: All About ICE

Description:

1. Reflectivity of ICE
2. Contribution of ICE and SNOW to the water cycle – by displaying coloured ice and snow
3. Effect of Debris on Glaciers

Vivek Kumar

Title: Effects of waves in coastal areas.

Description: The model explains the effect of waves in coastal areas with two slope

types (30 degrees and 45 degrees) and also keeps some sediment at the bottom to see sediment transport along the coast. The model can be demonstrated by preparing a rectangular channel using glass slabs with open on top and filled with half water.

Other activities for water feature area (ground floor corridor area of ICWaR)

1. Atomization model

Atomization phenomenon will be demonstrated using an ultrasonic fogger or mist maker submerged in the water. A small disk inside the mist maker will vibrate ultrasonically when submerged in water. The vibration creates tiny water droplets that are released into the air as a fog or mist. This model will serve as a source of attraction for the kids.

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JRD TATA MEMORIAL LIBRARY (LIB)

JRD Tata Memorial Library (JRDTML) is one of the best Science and Technology libraries in India. Started in 1911, as one of the first three departments in the Institute, it has become a precious national resource centre in the field of Science and Technology. The library is located in about 5,000 sq. mts. area with a collection of nearly 5 lakh volumes of Books, Periodicals, Technical Reports, and Standards, and is one of the finest in the country. Currently, it subscribes to over 15,000 technical journals and periodicals.

The library activities during the IISc Open Day include:

- Display of reprint of the original copy of the Constitution
- Display of faculty publications
- Display of award-winning theses
- Display of rare books
- Display of posters on library services
- Conducting spot quiz for children
- Selfie points

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MANAGEMENT STUDIES (MS)

- Business Quiz
- Just a minute
- Business simulation games

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MATERIALS ENGINEERING (MAT. ENG.)

From the Stone Age to the Space Age, materials have defined human progress. Imagine ancient civilizations crafting tools from bronze, only to be outmatched by those who discovered the power of iron. Fast forward to today, and think about how plastics revolutionized everyday life, making products more affordable and accessible.

At the heart of every technological leap is materials engineering—the science of discovering, designing, and improving the stuff that builds our world. In our **Materials Engineering Department,** we develop, process, and test materials that make cutting-edge technology possible. From **computer chips to aircraft wings, golf clubs to biomedical devices,** our innovations power industries and improve lives.

Our researchers and engineers work with **metals, polymers, ceramics, liquid crystals, and composites** to advance fields like **energy, construction, electronics, biotechnology, and nanotechnology.**

Using both traditional techniques like **casting and rolling,** and modern techniques such as **additive manufacturing, plasma and radiation processing, AI-driven discovery,**

and computer simulations, we push the boundaries of what's possible.

Whether it's building **stronger, lighter, and more efficient materials** or pioneering the **next big breakthrough,** materials engineering is where science meets innovation.

We have a long-standing tradition of creating awe-inspiring displays for the IISc Open day, and this year too we have a plethora of amazing exhibits. To just name a few:

Why does tin "cry"?

Ever heard metal "cry"? In this experiment, we bend two tin bars—one at ***room temperature*** *and one* ***heated in boiling water.*** *The* ***cool tin bar*** *emits a distinct 'crying' sound, while the* ***heated one stays silent.***

So, what's happening? At lower temperatures, tin's atomic structure shifts in a process called ***crystal twinning,*** *producing the eerie noise. This simple yet fascinating experiment shows how* ***temperature affects material behavior****, a crucial factor in fields like* ***aerospace, electronics, and construction****.*
Science in action—loud and clear!

Dance or Sink! The Science of Oobleck

Can you walk - or even **dance**—on liquid?
With **oobleck,** you can! Step too slowly, and you'll sink like it's quicksand. But if you move fast, it's solid enough to hold you up.

Oobleck is a **non-Newtonian fluid,** meaning it doesn't follow the usual liquid rules. When you apply **sudden force,** its particles jam together, making it behave like a solid. But at rest, it flows like a liquid. This unique **viscoelastic behavior** is key to real-world applications, from body armor to futuristic materials.

So, will you **dance or sink**? Step up and find out!

Ants Like You've Never Seen Before!

What does an ant really look like up close? With a **scanning electron microscope (SEM)**, we can see details far beyond what the human eye or even a regular microscope can reveal!

Unlike light microscopes, which use visible light, **SEMs use a beam of electrons** to scan the surface of an object, producing incredibly detailed, high-resolution images. This technique lets us zoom in on an ant's **compound eyes**, made up of **thousands of tiny lenses,** as well as the **intricate textures,**

fine hairs, and hidden structures that help ants navigate their world.

But SEM isn't just for looking at insects—it's one of the **most powerful tools in materials engineering.** In our department, SEM is **routinely used in research** to analyze metals, polymers, and advanced materials at the microscopic level. It helps us design **stronger, smarter, and more efficient** materials for real-world applications.

Step into the microscopic world and discover the **jaw-dropping details** of both nature and engineering - one electron at a time!

Liquid Nitrogen Ice Cream – Science Has Never Tasted This Good!

Get ready for a treat—literally! We're making **ice cream in seconds** using **liquid nitrogen,** and yes, it's as cool as it sounds (literally -196°C!).

By **flash freezing** the ingredients, liquid nitrogen creates **ultra-smooth, ultra-creamy** ice cream with an irresistibly silky texture. The rapid freezing prevents large ice crystals from forming, giving you a scoop that's smoother

than anything you've ever tasted. And let's be honest—**science is even better when it's delicious!**

So grab a spoon and enjoy a bite of **science in action**—it's the **coolest way** to learn!

<u>And That's Just the Beginning!</u>

These are just a **few** of the exciting experiments we have lined up for you—we're only getting started! There's so much more to **see, try, and explore,** including:

- **Shape memory effect** – Watch metals "remember" their shape!
- **Ductile-to-brittle transition** – See how metals behave differently at extreme temperatures.
- **High-Tc superconductivity (Meissner effect)** – Experience the magic of levitating magnets!
- **Thermoelectric effect** – Turning heat into electricity? Yes, really!
- **Laser interferometry** – Precision measurement at its finest.
- **Live thermal expansion demo** – Watch materials expand before your eyes.
- **Color-changing nanocrystals** – Science meets stunning visuals!

Plus, we have **fascinating exhibits** featuring **metals, minerals, ancient artifacts, aeronautical tech, and biomedical devices.** Get ready for hands-on science, mind-blowing discoveries, and a whole lot of fun!

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MECHANICAL ENGINEERING (ME)

Turning Ideas into Motion

WATER ROCKET

Experience Newton's Third Law in action as we launch high-speed water-powered rockets into the sky! Get hands-on and see how science makes things fly!

PUZZLE FUSION

Love cracking puzzles? Get ready to assemble, disassemble, and reassemble mechanical structures! A perfect brain-teasing challenge for problem solvers and tinkerers alike!

FLAMING WONDERS

Witness the mesmerizing power of fire! Explore dazzling flame experiments, fuel combustion, and fiery tricks in an exhilarating showcase of science and spectacle!

CIBYCLE THINK

Think cycling is easy? Think again! Try conquering the Reverse Bicycle, where turning left makes you go right! A mind-bending challenge that will test your coordination and patience. Are you up for it?

MECH-WIZ

Are you the ultimate mechanical genius? Test your knowledge in this fast-paced, fun-filled Mechanical Engineering Quiz! Bragging rights and surprises await the smartest minds!

DRONE SHOW

Watch drones take flight and perform incredible maneuvers! A spectacular aerial showcase that blends technology and entertainment.

INSTANT ICE CREAM

Ever tried ice cream made in seconds? Witness the magic of liquid nitrogen as it instantly freezes your treat. A cool (literally!) experience for all food lovers!

INTERACTIVE COMPLIANCE

Play with compliant mechanisms and explore how flexible designs can perform unexpected yet exciting tasks. Fun, interactive, and mind opening!

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MICROBIOLOGY AND CELL BIOLOGY (MCB)

This year the Department of Microbiology and Cell Biology (MCB) will showcase an exciting combination of scientific display, educational puzzles, quizzes, interactive demonstrations, and intricate models, offering visitors an engaging look into its diverse research domains. These captivating exhibits promise to fascinate both children and adults through reward-based fun games and carefully crafted intellectual displays focused on cell science & disease-related research.

In the area of **Microbiology, Virology, and Immunology**, guests will encounter:

- Disc Diffusion Assay showcasing bacterial resistance to antibiotics like Ampicillin, Kanamycin, and Chloramphenicol.
- Awareness posters on hospital-acquired infections and preventive measures.
- A physiological model demonstrating how pathogens form biofilms on medical devices, using catheter tubes grown with microbes.
- Agar Art exhibit featuring microbial artwork made with fluorescent bacteria.

- An interactive bacteria labelling game, rewarding participants who correctly identify bacterial organelles.

Exploring **Molecular and Cell Biology,** groups from MCB will illustrate:

- Cell division and cytokinesis through engaging model demonstrations.
- Fun science quizzes, word searches, and size arrangement challenges emphasizing fundamental concepts in cell biology.

Highlighting the critical interactions between **Cancer and the Immune System** we will showcase:

- How cells turn malignant in cancer.
- How immune cells recognize and combat cancer cells.
- Cellular responses to viral infections.

In **Plant and Developmental Biology,** visitors will delve into:

- The function and importance of plastids, essential organelles for plant survival.
- Exploration of natural and mutant variants showcasing altered plastid transformations.
- Interactive quizzes and games to deepen understanding of plant biology.

Finally, in the domain of **microRNAs, AlphaFold, and emerging viruses:**

- Visitors will learn about groundbreaking Nobel Prize-winning research on microRNAs and their impact on gene regulation and disease.
- Hands-on experiences with AlphaFold, an innovative AI tool revolutionizing protein structure prediction.
- Discussions and displays on significant viral threats, including Guillain-Barré syndrome-associated viruses, evolving variants of SARS-CoV-2, and their implications for global health.

Together, these thoughtfully designed exhibits and interactive activities will bring complex biological concepts to life, making science accessible and enjoyable for all ages.

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PHYSICS (PHY)

Experimental Demonstrations

1. Spacecraft and instrument models by ISRO team
2. Stroboscopic effect
3. Fiber-optic communication system
4. Thermoelectric power generator
5. Electromagnetic Induction
6. Helium balloon release

7. Liquid nitrogen engine
8. Light Emitting Diodes
9. Poisson Spot
10. Fluorescence in different materials demonstration using UV laser light
11. Demonstration of atmospheric pressure
12. Plasma instabilities, ITER 3D model, and Kalliroscope
13. Demos on computational physics
14. Bernoulli's principle
15. Angular momentum conservation

Posters and Talks

1. Quantum Emitters
2. Understanding the beauty of complexity by simulation
3. Electron: The Universal Glue
4. Astrophysics

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ROBERT BOSCH CENTRE FOR CYBER PHYSICAL SYSTEMS (CPS)

Exhibits

1. **Stretch Robot Ball Tracking:** The robot's arm tracks and interacts with a moving ball, using vision-based control to follow its trajectory.
2. **Stretch Robot Object Grasp and Handover:** In this demo, Stretch attempts

to grasp an isolated object from a flat surface and hands it over to the participant.

3. **ARMBOT Self-Driving Car:** A robotic ground vehicle autonomously navigates its environment using sensor-based localization and path planning while avoiding obstacles
4. **Balancing Ball Robot:** A parallel manipulator dynamically stabilizes and controls the movement of a rolling ball on its platform.
5. **Unitree go1 and MULE:** This demonstration showcases the capabilities of two quadrupedal robots: Unitree Go1 and MULE. The Unitree Go1 is a lightweight, agile robot designed for autonomous navigation and dynamic locomotion, while MULE is a more robust platform suited for rough terrain and high-impact tasks. The demonstration will highlight key aspects of robot locomotion, real-time control, and proprioceptive planning, illustrating their potential applications in search and rescue, logistics, and field robotics. The event will include live demonstrations of movement, obstacle negotiation, and autonomous behaviour.
6. **OVITA:** OVITA is an interpretable, open-

vocabulary framework that adapts robot trajectories based on human instructions. It leverages multiple pre-trained LLM agents to translate user commands into detailed manipulation adaptations while providing transparent explanations. The system ensures constraint satisfaction, visualizes updates for review, and enables iterative refinement, removing the need for expert users.

7. “**AI Arena:** The Battle of Intelligence”

Event Overview:

“AI Arena: The Battle of Intelligence” is an interactive event where visitors will compete against AI bots in a series of games with increasing difficulty levels. The event aims to showcase the power of AI, how it learns, and its potential in decision-making and strategy. This engaging setup will provide an exciting experience for students, researchers, and the general public, demonstrating both AI capabilities and its limitations.

Event Format & Setup:

- **Number of Setups: 3 (Easy, Medium, Hard)**
- **Game Categories:**
  - **Easy Level:** Simple AI-based games (e.g., Tic-Tac-Toe, Rock-Paper-

Scissors, Number Guessing).

› **Medium Level:** AI-driven strategic games (e.g., Chess, Connect-4, Logic Puzzles).

› **Hard Level:** AI-powered complex decision-making tasks (e.g., Reinforcement Learning-based games, AI-driven problem-solving).

- **Live AI Training Demo:**
  - › A brief introduction to how AI models are trained and how they improve performance.
  - › Interactive audience participation to tweak AI behavior in real-time.

Expected Outcome:

- Provide a hands-on experience with AI and its learning process.
- Engage participants in a fun yet informative AI vs. Human challenge.
- Foster discussions on AI decision-making, its advantages, and its ethical implications.

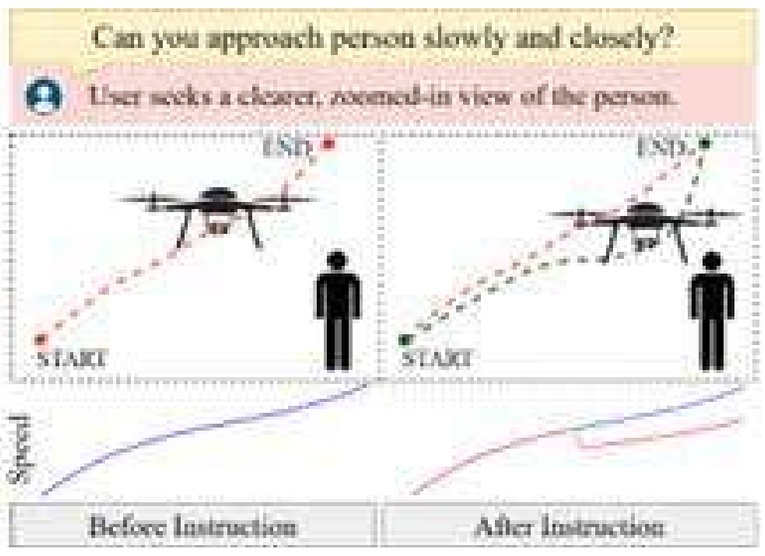
ARMBOT

Hello Robot

Hexa4Aduza

MULE

Go1



OVITA

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SUPERCOMPUTER EDUCATION AND RESEARCH CENTRE (SERC)

1. Scheduled presentations on introduction to supercomputer, supercomputer infrastructure, research and applications on supercomputers
2. Skeleton of a supercomputer - come, look into the internals of a supercomputer
3. Param Pravega supercomputer - Take a look around the IISc and Nation’s pride.
4. SERC Museum - A display of archaic (super)computer components
5. Posters on our HPC facility evolution and research done on supercomputers.

6. Participate in our Quizzes and more!

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UNDERGRADUATE PROGRAMME (UG)

Exhibits/Experiments

The **Open Day 2025** at the **Old Physics Building (OPB)** sounds like it's going to be a fantastic event with something for everyone, no matter their interest in science! The combination of **hands-on exhibits, live experiments, and interactive demonstrations across different disciplines** is bound to make for a fun and educational experience **under one roof in one go.**

Here's a quick idea of what each discipline could offer in this event: **Biology, Chemistry, Computers, Earth Science, Mathematics, Materials, Physics.**

Location: The exhibits will be set up in the Old Physics Building (OPB), conveniently near the JRD Tata Memorial Library and the Main Gate, making it easy for visitors to find.

The event sounds like a great opportunity to immerse in the world of science in a relaxed, fun environment while learning new things. It would be a fantastic way for students, families, and science enthusiasts

to connect with the sciences in a meaningful way. What are you most excited to see at the event?

Note: Visitors also get hands-on experience from the most of activities that are planned at one place

Biology: Room No. G01/ Wifi Room		
Sl. No	**Experiment Name**	**Short Description**
1.	Prey-Predator Interaction & Evolution	Simulation of prey-predator interaction to show evolution and speciation using random motion and randomized attributes. Can a prey escape 4 predators in a turn wise game on planar graphs? Let's find out!
2.	Pandemic Simulator	**What exactly happens in pandemics?** Should we be worried? Let's answer these questions and more by simulating some pandemics using the SEIR model!
3.	Microscopy	The Microscopic Realm welcomes you! Check out the essential microorganisms that makes or breaks a researcher's work.
4.	Ecology Demonstrations	**Oh? You couldn't catch that butterfly?** Take a closer look at butterflies and other organisms and find out what they're hiding!

5.	Neuron – Electronics Model	**Electricity flowing through your body?!** No you're not electrocuted. It's your neurons! Come watch it work!!
6.	Slime Mould solving maze	**Nature's algorithm:** Slime mould's greedy Quest. Let's follow through this journey of these funky creatures.
7.	Transfer of Memory in C. Elegans	**Humans are the only ones with memory? FALSE!** Observe these tiny worms showing off their memory powers.
8.	Plant grafting and Vegetative cells	Why do people say animals are more complex than plants..? Let's ponder about a bit, and understand what makes the difference, and also think about What facilitates plan grafting? Do plants have immune system? What if humans have no immune system?
9.	Visual Illusions & Stroop Effect	Its a thought provoking thing that human brain, being so complex and smart, can be easily tricked by illusions. Let's delve into the science of what causes optical illusion, and also know how different types of visuals can affect our actions and reactions.

10.	Plant Grafting and Vegetative Cells	Why do people say animals are more complex than plants..? Let’s ponder about a bit, and understand what makes the difference, and also think about What fa-cilitates plan grafting? Do plants have immune system? What if humans have no immune system?
11.	Environmental sample microbes	Since childhood everyone told us to maintain hygiene and sanitation. But have you ever observed the deep-down tiny-miny reasons behind them. Let’s get our microscopes on board and see what’s deep-down on the surface of some common objects.
12.	Plasmid digestion assay	Engineering Life, **One Gene at a Time!** Have you ever pondered how you can insert a gene into a bacteria? Have a look on how the bacterial delivery agents do their job.
13.	Agar art	The intersection of Biology and Art! Check out these beautiful artworks created by the microbes used in research.

Chemistry: Room No. G01		
Sl. No.	**Experiment Name**	**Short Description**
14.	Luminol Lighthouse	Witness the beauty of **Chemiluminescence** in action with bursts of blue light at predictable intervals, just like a **Mini Light House.**
15.	Indigo Dye	The blue jeans we wear are dyed with **Indigo** - but if indigo isn't soluble in water, how is this possible?
16.	Bleeding Heart	Watch out for an **Iron heart** that starts to bleed after dropping it into a solution that just appears like water.
17.	Nylon 6,6	Watch chemistry in action as a liquid transform into strong, durable **Nylon fibres** right before your eyes!
18.	Demonstrating Chirality using Corn Syrup	Watch a rainbow of light unfold as **Corn syrup** reveals the dazzling effects of **Molecular Chirality!**
19.	Underwater fireworks	Marvel at **Sizzling fireworks**—not in the sky, but bubbling to life under-water in a test tube!
20.	Hidden messages	Spray a mysterious solution on a white paper to uncover **hidden words in tricolour hues.**

Computers: Wifi ROOM		
Will show current technological improvement in Computer science.		
Earth and Environmental Engineering: Earth Science Lab		
Sl. no.	**Experiment Name**	**Short Description**
21.	Seismometer	Working of seismometer
22.	Measuring distances and angles.	Use trigonometry and measure the angle made by a line of sight to find the distance of objects. Measuring inclination using a clinometer.
23.	Approximating the age of a tree using tree rings	Explain how this can be done to the viewers with the help of a sample from a log.
24.	Demonstrate	Demonstrate ocean acid-ification using sea shells, acid/carbonated beverages, and pH paper. Include other climate change phenomena related to oceans and seas.
25.	Optical demonstration	Showing a magnified view of strips of rocks and minerals using a microscope.

Mathematics: I Floor Open Area		
Sl. no.	**Experiment Name**	**Short Description**
26.	Logic of Maths	Card Trick
27.	Maths in life 1	A stall explaining paradoxes in Probability
28.	Maths in life 2	Riddles & Puzzles
29.	Fun with Maths	Interactive games (Brussels sprouts & 21)
30.	Maths in Musics	Mathematics behind scale of notes in music
31.	False proofs	
32.	Maths In Technology	A demonstration for proba-bility simulation (running on computer in background)

Materials: Materials Lab, I Floor		
Sl. no.	**Experiment Name**	**Short Description**
33.	Nylon	A material that defined WWII with it’s use in para-chutes, mosquito netting g, etc. Will show the classic Nylon rope experiment.

34.	Refractive Index	Observe how this glass rod appears to disappear in a refractive index matched media. This simple physical fact can be used to design technological devices such as fibre optic cables, photonic crystals, invis-ibility cloaks for military aircraft, etc.
35.	Material Structure	In these demos, one can see how the structure at the smallest level (crystal modes), micron level (microstructure) , and macro level such as in this keystone bridge intrinsically determines function

Physics: I Floor Open Area		
Sl. no.	**Experiment Name**	**Short Description**
36.	Path of an Electron	Electrons are emitted from a cathode by thermionic emission and are deflected under constant magnetic field (produced by a Helm-holtz Coil), causing circular and helical path patterns (of charged inert gas ions) depending on angle of ejected cathode rays.

37.	Lenz’s Law	Small Neodymium magnets are allowed to freely fall through different pipes (Plastic and different metals). Lenz’s Law causes magnets to fall slower in some pipes. Also appre-ciate how different metals interact differently.
38.	Magic Dropper (Pascal’s Law)	A dropper is filled with water exactly to the point that it is just immersed (net force on it is zero) in a bigger container of water (preferably a plastic bottle). We place our palm on top of the rim of the bottle and apply pressure. By Pascal’s law, pressure is applied equally throughout the fluid and water goes inside the dropper causing its weight to dominate over buoyant force, and thereby sink. This effect can be controlled by tightening and relaxing the palm without the audience noticing, giving an idea as if the dropper is being controlled by psychic powers.

39.	Reflection from an Ellipse	The Reflective property of an ellipse is simply this: when a Ray-leaves one of the foci and meets a point on that ellipse, it will reflect off of the ellipse and pass through the other focus. We will carve the shape on a plywood and hopefully we will achieve the thing.
40.	Braes Paradox in physical systems.	In this experiment we will construct a simple spring & String - mass system to show Braess paradox. The paradox in computer science states that greedy algorithm doesn't always lead to global optimation.
		Using this experiment, we will show that on cutting one of the strings, the motion of mass is counter-intuitive and thus demon-strate the paradox in physical systems.

UG FUN ZONE Activities:

These are planned for School Kids as well PUC/10+2 students

Sl. No.	Experiment Name	Short Description
1.	Insects Visualisation	Insects' magnification under stereo microscope
2.	Blue Bottle Experiment	**Redox reaction in action!** A colourless solution yields a fleeting **BLUE SURPRISE** after a nice shake.
3.	Golden Rain	Is it possible to have a gleaming **Gold Shower** inside a beaker?
4.	Earth Science	Volcano Burst/ Rocks in Earth
5.	Air Electrical Break down	Two capacitors are placed near to each other and their potential difference is gradually increased. We observe that at very high potential there is an electrostatic breakdown at which air gets ionized and starts to conduct.

6.	Ping-Pong Bell	Oscillation of a metallic ball in between charged capacitor plates
7.	Fun with electric charges	We charge different objects (like glass rod, nylon cloth cat fur) etc by friction and then show electrostatic repulsion and attraction affects
8.	Gyroscope	In this experiment, a person sits on a rotatable chair holding a spinning flywheel. When the
		person tilts the flywheel, the chair begins to rotate, illustrating the gyroscopic effect.
9.	Chladni Plates	When the plate is oscillating in a particular mode of vibration, one can see standing waves in a visually striking fashion.

10.	Brachisto-chrone/Roller Coaster	Small balls are simultaneously released along different paths to travel from one point to another under the influence of gravity. We will observe that the path on which the ball takes least time is the brachiostone curve.

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DEVELOPMENTAL BIOLOGY AND GENETICS (DBG)

In our exhibition, we'll showcase fascinating models, such as:

1. A 3D model of our DNA, the precious inheritance from our mothers and fathers.
2. A model showcasing the visual tale of the Central Dogma, unravelling the journey of information within our genes transforming into proteins which orchestrate essential functions like walking, talking, loving, and more.
3. Ever wondered what those delightful proteins look like? We'll unveil the visual

journey through a model, from their infancy (Primary Structure) to their growth and transformation, akin to a child maturing (Secondary, Tertiary, and Quaternary Structure).

4. A model which will let us experience the behind-the-scenes action as we reveal how we assemble ribosome, the machines that tirelessly build our biceps during exercise, to make proteins.

But it’s not just about observing; our visitors will also enjoy solving puzzles, unlocking the secrets of these processes on their own.

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DIVECHA CENTRE FOR CLIMATE CHANGE (DCCC)

Event Details

S.No.	Details
1	DCCC Quiz program related to Climate and Environment, Glaciology
2	Video on Glaciology
3	10 minutes talk by Dr. H. Paramesh Lecture – Environment pollution and Human Health

Demonstration

S.No.	Details
1	Light scattering by atmospheric aerosols
2	Measurement of soot/black carbon particles
3	Know Your BMI, Food charts
4	Agroecossytems and Smart Irrigation to Save the Planet
5	How Plants Shield Against Soil Erosion
6	Nature’s Cry: Effect of acid rain on plant life
7	Water Bodies in Trouble: Fertilizer Pollution
8	Healthy Soil, Healthy Plants, Healthy You
9	Small Bites/ Big Impact: How food choices affect the climate

Poster Exhibits

1	Aerosols measurement and instrumentation
2	Black carbon from urban and rural regions of India
3	Basics of atmospheric aerosols
4	Health effects of chemical contaminants in drinking waste Micro plastic contamination in drinking water

5	Congective use of surface and groundwater for sustainable development of water resources
6	Water from Air
7	Women and Climate Change
8	Microbes in food production and combating malnutrition
9	Plant-microbe interactions and food security
10	Economic modelling for evaluating climate policies
11	10 New Insights into Climate Science (10NICS), Responsible Consumption
12	Glacier Lake Outburst Flood
13	Indus water Treat

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