EXPLORE,
EXPERIENCE & ENJOY!

INDIAN INSTITUTE OF SCIENCE
भारतीय विज्ञान संस्थान

Open Day 2026

SATURDAY, 7 MAR
9 AM – 5 PM

★ 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)

- [Divecha Centre for Climate Change (DCCC)](#)
- [Electrical Communication Engineering (ECE)](#)
- [Inorganic and Physical Chemistry (IPC)](#)
- [Instrumentation and Applied Physics (IAP)](#)
- [Interdisciplinary Centre for Water Research (ICWaR)](#)
- [Management Studies (MS)](#)
- [Materials Engineering (MTE)](#)
- [Materials Research Centre (MRC)](#)
- [Mathematics (MA)](#)
- [Robert Bosch Centre for Cyber Physical Systems (CPS)](#)
- [Supercomputer Education and Research Centre (SERC)](#)

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.
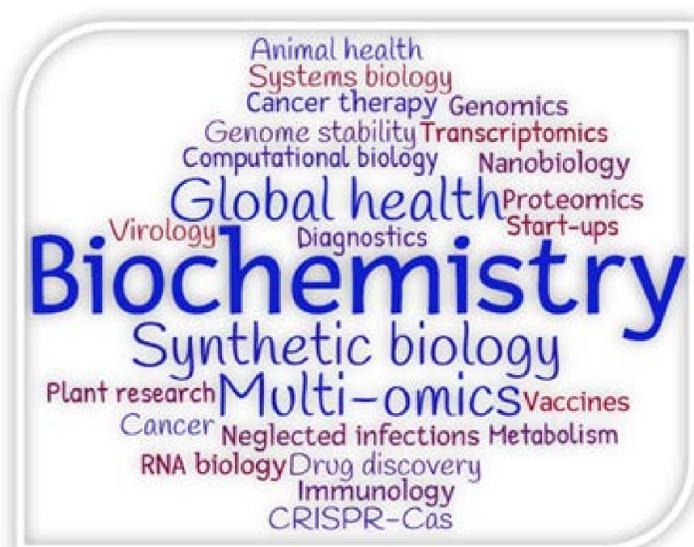
The department is famous for its translational research resulting in development of vaccines and diagnostics kits for the society. Multiple successful starts-ups have been spun out by the faculty in this department. We are celebrating the Centenary of the department and an exhibition highlighting past 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 7, 2026.

CENTRE FOR NANO SCIENCE 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.
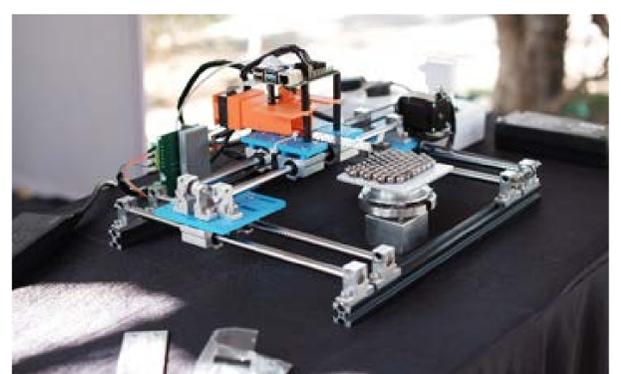
3. How Do Diamonds Grow? – Discover the fascinating process of crystal formation.
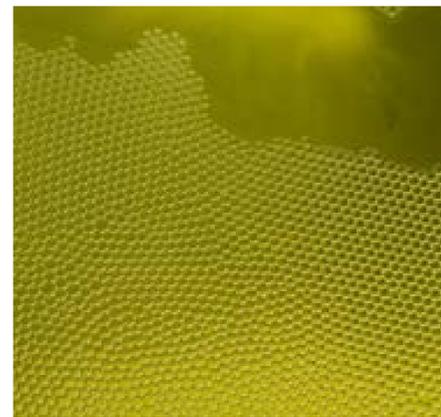
4. Dancing Rangoli – Witness art and physics merge in a mesmerizing display.

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 a 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. Superconducting Levitation

19. Let's Explore Our Brain! – Hands-on neuroscience activities for all ages.

20. Flexible Solar Cells and Their World of Possibilities – The future of bendable, lightweight solar panels.

21. Am I Seeing Right? – Optical illusions that challenge your perception.

22. Can you trap sound? – see what happens when sound gets confined into structures.

23. Visualising magnetic fields: Visualise Magnetic fields through xenon tubes

24. 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 comesalive through engaging demos, hands-on interactions, and eye-opening discoveries.

CENTRE FOR INFRASTRUCTURE, SUSTAINABLE TRANSPORTATION AND URBAN PLANNING (CiSTUP)

At the Centre for Infrastructure, Sustainable Transportation and Urban Planning (CiSTUP), we conduct research on mobility models for demand and traffic prediction, AI-based sensing, public transportation planning, routing and scheduling problems in logistics, simulation models, and transportation safety. Someofoureventswillshowcasethisresearch while also educating young minds about the mobility challenges we face and the potential solutions.

1. Transportation quiz
2. Traffic signal game
3. Shortest paths
4. Traffic sign detection using AI

5. Driving simulators (heavy vehicles, car parking, and VR bicycle)
6. How well do you know traffic rules?
7. Traveling salesman competition
8. Jigsaw puzzle
9. People tracking demo
10. Match the cards (Kids zone)
11. Pick your sign
12. How Transportation Projects are Evaluated: A Hands-on Experience with Multi-modal Mobility Modelling Tools

MICROBIOLOGY AND CELL BIOLOGY (MCB)

The Department of Microbiology and Cell Biology (MCB) welcomes visitors to Open Day 2026 with a bright and engaging collection of hands-on demonstrations, eyecatching models, and fun activities that showcase the wide variety of science happening in the department. The world of microbes takes center stage, with exhibits that introduce visitors to infectious diseases, viruses, antibiotic resistance, and how microbes evolve and adapt **(Saumitra Das, K.N. Balaji, Shashank Tripathi, Amit Singh, Dipshikha Chakraborty, Samay Pande)**.

Alongside these, visitors can explore how our cells divide, function and what goes wrong in diseases, through displays on ageing and heart health, how cells transport materials, how tiny droplets inside cells help them function, and simple explanations of how brain cancer develops **(Sachin Kotak, Subba Rao GangiShetty, N. Ravi Sundareshan, Shovamayee Maharana, Kumaravel Somasundaram, Sudha Kumari, William Surin)**. Adding color and creativity, the plant biology exhibits show how plants grow, form leaves and flowers, and make their own food using sunlight, featuring models and activities that highlight plant development and photosynthesis **(Usha Vijay Raghavan, Utpal Nath, Naresh Loudya)**.

Together, these exhibits offer a lively, familyfriendly experience that invites visitors to discover the amazing worlds of microbes, cells, and plants — and to enjoy the many wonders of life. Together, these exhibits create a lively, educational, and familyfriendly experience that invites visitors to journey through microbes, cells, plants, and complex biological mechanisms and enjoy the many wonders of life.

CENTRE FOR ATMOSPHERIC AND OCEANIC SCIENCES (CAOS)

CAOS advances weather and climate science by combining field campaigns with theory and numerical modelling. Through major field campaigns, CAOS has improved understanding of monsoon variability, boundary-layer processes, air–sea coupling, aerosol science, and Indian Ocean dynamics, and has shaped research on atmosphere, ocean, and climate dynamics.

Open Day demonstrations

- **Weather and Climate Services:** live forecasts and satellite imagery, and how observations become actionable information.

- **Instruments Corner:** anemometer, sling psychrometer, and radiosonde, and how we measure winds, humidity, and the atmosphere aloft.

- **Chaos & Weather Prediction:** simple systems that reveal limits to weather predictability.

- **Ocean Waves**: interface waves in the ocean and what they imply for mixing and transport.

- **Rotating Table + Ocean Circulation:** ocean dynamics in miniature - circulation patterns, fronts, and rotating-fluid dynamics.

- **Einstein's Tea Leaves:** secondary circulation and shear-flow instability, plus analogies to jet-stream meandering and atmospheric dynamics.

- **Vortices in action:** how rotating flows form and persist, highlighting the core physics behind coherent structures androtating storms.

- **Stokes Flow:** "creeping flow" at low Reynolds number, when viscosity dominates motion.

- **El Niño & La Niña:** trade winds, upwelling, and coupled ocean–atmosphere variability.

- **Solar Geoengineering:** what interventions might do, what the downsides can be, and why risks and trade-offs matter.

and more...
More information: **caos.iisc.ac.in**

DIVECHA CENTRE FOR CLIMATE CHANGE (DCCC)

Events

Sl. No.	Details
1	DCCC Quiz program related to Climate, Environment and Glaciology
2	10 minutes talk by Dr. H Paramesh

Demonstration

Sl. No.	Details
1	BMI Calculator
2	Balance v/s Bloom – Impact of nutrients on the ecosystem
3	Small Bites, Big Impact: How Food Choices Affect Climate
4	Measurement of soot / black carbon particles
5	Measurement of PM particles
6	Does climate change affect us all the same?
7	AI/ML Forecast model's hands-on simulations (dtions)
8	Sugar Board- Model
9	Demonstration of spelepthem as climate archives
10	Model showing various glacier features

Poster Exhibits

Sl. No.	Details
1	Eat Healthy
2	Millets of India
3	Millets and Food Security
4	What are Aerosols?
5	Aerosol Measurement and Instrumentation
6	Black carbon variations from urban and rural regions of India
7	Corals: Living archives of climate (with display of coral samples)
8	Soil Map of India
9	Food System Change
10	10 NICS (10 New Insights in Climate Science 2025/2026)
11	Emerging pollutants in groundwater - Examples from Karnataka
12	Climate change over exploitation of groundwater and desertification
13	Role of perennial lakes in sustainable water supply in rural India
14	Effect of Climate Change on Glaciers
15	Glacier Lake Outburst Flood

IISc | OPEN DAY 2026

SUPERCOMPUTER EDUCATION AND RESEARCH CENTRE (SERC)

1. Presentations on introduction to supercomputer, supercomputer infrastructure, research and applications on supercomputers.

2. Param Pravega supercomputer - Take a look around the IISc and Nation's pride.

3. Building a Data Center - As the country pushes for large data centers, visit the data centers for HPC and AI in SERC.

4. SERC Museum - A display of archaic (super) computer components.

5. Posters on our HPC facility evolution and research done on supercomputers.

6. Visual displays of SERC's HPC infrastructure.

7. Participate in our Quizzes and more!

ELECTRICAL COMMUNICATION ENGINEERING (ECE)

1. LFR Robot Ride

IR sensor-based robot which follows coloured pathway.

2. League of AI Humans

Will showcase a set of AI-generated videos, and an AI-based scorer will rate them. The audience will be invited to interpret the videos and share their understanding After that team will explain how the AI scorer evaluates the videos.

The goal of this activity is to help people understand how AI-generated videos are improving day by day. Motto: "How well people understand AI."

3. Reflect to Connect (RIS - 5G)

Will demonstrate how RIS acts as a smart reflector that redirects wireless signals toward the user when the direct path from the base station is blocked. By integrating RIS with a live 5G network, team will show measurable throughput gains and improved link reliability. The setup includes simple visual and real-time performance demonstrations.

4. Game on IRS

Game on adjusting IRS to meet an instantaneous SNR threshold. Display the status on the large screen where the player can play around with the IRS to adjust the instantaneous SNR.
Goal: Get inst SNR >= threshold.

5. Technical and Fun Talks at GJH

Will have technical talks and open mic fun talks by volunteers.

6. Role of Circular Polarization in Satellite Links

Satellite communication suffers from antenna misalignment and Faraday rotation cause severe polarization loss. Will demonstrate that Circular polarization minimizes polarization mismatch, ensuring stable and reliable satellite links despite rotation and propagation effects.

7. Fun activities with lasers

Will demonstrate fun activities using lasers fundamentals.

8. Fourier Games

Game explaining Fourier series in a fun way. Goal of the game: Fine tune the co-efficient of sinusoids to match a waveform.

9. Sample It Right

Game explaining Nyquist Sampling Criterion. Goal: Pick the right frequency for sampling. Shows what happens when aliasing occurs.

10. Puzzles and Tricks

Some card tricks demonstrating principles of Probability, QR code puzzle and a board game based on hamming code etc.

11. Fun activities with LASERs

Will be demonstrating fun activities and experiments using LASERs, along with their fundamental principles.

12. SimYog: Electromagnetic Compatibility

Demonstration of Electromagnetic Compatibility by SimYog (IISc-ECE incubated company)

13. The Journey through Minuscule

Journey Through the Minuscule will show how to build a DIY microscope using cardboard and optical lenses, allowing visitors to view various samples.

14. Laser Maze

A simple laser-based game using mirrors/targets/photodiodes where participants guide a laser beam to hit specific targets.

15. Art with Light

An interactive setup explaining polarization of light. Explaining what polarization is and the cause of colour in objects. Showing colour changing patterns/art using overlapped polarization sheets.

16. Simulations on Opinion dynamics

Create interactive simulations on opinion dynamics on graphs or simulations of other related problems.

ROBERT BOSCH CENTRE FOR CYBER PHYSICAL SYSTEMS (CPS)

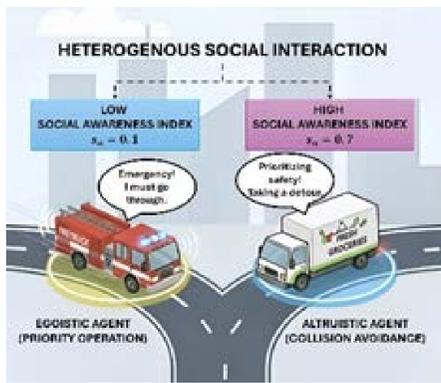### Stretch Robot Object Tracking

Balancing Ball Robot

Complex Tasks for Robotic Manipulators

Autonomous Exploration

Multiple Robots in Dynamic Environment
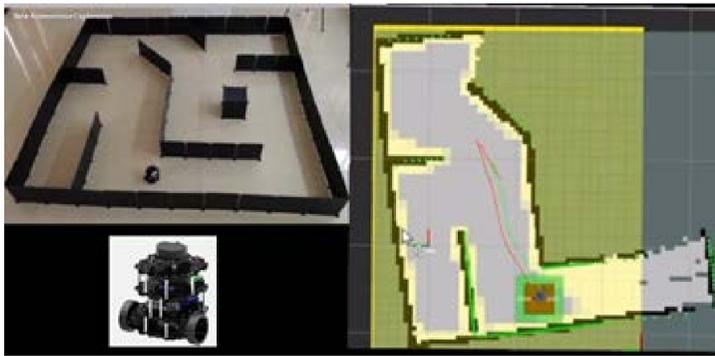
Drone Simulator

F1-TENTH

Hydration Stand

Quadrupedal Robot Walking and Dance Demonstration

Inside a Robot: Actuator Functionality Demonstration

POWERGRID Centre of Excellence (PGCoE)

Cybersecurity for Power Systems

The POWERGRID Centre of Excellence (PGCoE) is a think tank focussed on cybersecurity for power transmission and grid operations. It was established through a collaboration between POWERGRID Corporation of India Ltd and Foundation for Science Innovation and Development (FSID) at IISC to address rising cyber threats to critical power infrastructure.

The centre's mission includes research, technology development, preparedness, and competency building to enhance the resilience of power systems against cyberattacks. Its work covers cybersecurity at various levels including device security, network security and application security. It focuses on defence system development, cybersecurity maturity frameworks, and upskilling professionals in cybersecurity.

PGCoE brings together experts from academia, industry, and research labs to create effective solutions relevant to national grid security through projects, technical talks, symposiums, and events on cutting-edge cybersecurity topics. Overall, PGCoE acts as a hub for securing India's power infrastructure from evolving cyber threats by integrating research, training, and technology development.

For IISC Open Day 2026, PGCoE has planned engaging poster exhibition highlighting our ongoing research activities. Our videos cover a lab tour of the facility supports testing of advanced power grid technologies and provides platforms for collaborative research in the power sector.

Posters

1. Overall architecture for PGCoE activities.
2. Machine Learning based Intrusion Detection System.
3. Unsupervised Learning based cyber-attack detection.
4. Video of Lab tour.

PGCoE Cyber-Physical Systems Laboratory

The PGCoE laboratory, located in the Department of Electrical Engineering, will showcase a cyber-physical utility

automation system developed for advanced cybersecurity research. The facility includes a Network Control Centre with a scaled version of a primary power system with two areas, which reflects real-world grid monitoring and control.

The laboratory features secondary systems from multiple OEMs, implementing process-bus−based digital substation automation. This realistic, multi-vendor environment enables focused research on cybersecurity, interoperability, legacy system integration and resilience of modern power grids, providing a unique testbed for securing next-generation utility automation systems.

Requirements

· Poster display boards
· High-quality printed posters
· Tables − 1, Tablecloth, Chairs -2

Audio-Visual & IT Setup

· LED for videos and lab tour
· Cables, adapters, extension cords
· Network

DEVELOPMENTAL BIOLOGY AND GENETICS (DBG)

Telomere Integrity and Molecular Oncology Lab (Telo-In-MolOnc) focusses on chasing chromosome ends to stop cancer beginnings. Our chromosomes wear little hats that protect it from getting damage. But with age, these hats undergo wear and tear and drive cellular ageing and death. Some naughty cells find new ways to mend these hats again to become immortal and become the bad guys in our body – a.k.a – cancer cells. We aim to understand the escape routes used by these naughty cells to become immortal and cancerous. We plan to turn cancer's clever tricks into new targets for smarter and kinder treatment options.

1) A model and a video to depict the story - "The Endless Chromosome: A way to immortality" where Captain Telomere guards the ends of life… but the rogue villains strike from the shadows. Who will outsmart whom in this epic battle where every chromosome counts?

2) Poster of cancer's sneaky exits.

3) Flash card and puzzle game to engage students.

4) Goodies such as cards of their favourite characters of the movie- "The Endless

Chromosome: A way to immortality", paper watches (Telomere Timekeepers) and others.

JRD TATA MEMORIAL LIBRARY (JRDTML)

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 of the Institute, it has become a precious national resource centre in the field of Science and Technology. The library is located in an area of about 5,000 sq. mts. and houses a collection of nearly 5 lakh volumes of Books, Periodicals, Technical Reports, and Standards, and is one of the finest in the country. Being a member of the 'One Nation One Subscription (ONOS)' initiative of the Ministry of Education, GoI, the library subscribes to over 15,000 technical journals and periodicals.

The library activities include:
· Library Tour
· Display of a 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

- A spot quiz for children
- Selfie points

COMPUTER SCIENCE AND AUTOMATION (CSA)

1. Technical Events

- **OpenHack – AI/ML Hackathon (Prize Pool: ₹30,000)**

An AI/ML-focused hackathon where participants work on real-world problem statements. Teams will design, train, and evaluate intelligent models within a fixed duration. The event aims to promote applied machine learning, innovation, and collaborative problem-solving.

- **Competitive Programming Challenge**

A timed coding contest designed to test algorithmic thinking and problem-solving ability. Problems will range from fundamental programming concepts to advanced algorithmic challenges.

- **Capture The Flag (Cybersecurity Challenge)**

Participants will analyze a deliberately vulnerable application and identify hidden bugs and security flaws. The event introduces

practical aspects of cybersecurity and ethical hacking.

- **Human vs AI**

An interactive demonstration where participants compete against Reinforcement Learning agents in two game environments:

- **2D Tennis**
- **Touchdown Simulation**

This event showcases how AI systems learn strategies and adapt through training.

2. Quizzes

Short, engaging quizzes covering AI/ML, Algorithms, Cybersecurity, and core Computer Science concepts. Designed to attract students from school to undergraduate levels.

3. Interactive Research Demos

- **Game Theory Demonstration (CSA Garden Activity Zone)**

Four game-theory inspired activities:
- Unique Candy Quest: Smallest unique number selection game.
- Axelrod's Tournament: Repeated strategic interaction simulation.
- Strategic Auction (Web-based): Competitive bidding simulation.
- Guess the Box-Size: Prediction-based coordination game.

- These activities demonstrate strategic decision-making and equilibrium concepts in an engaging format.

• **Graph Theory Demo**

Interactive mini-games explaining graph coloring, connectivity, pathfinding, and optimization concepts.

• **AI/ML Demo**

A visual demonstration explaining how AI models process and understand textual language using contextual embeddings and vector representations. The demo will illustrate how modern language models convert text into mathematical representations.

• **DISHA Demo**

A navigation assistance system designed for visually impaired individuals to safely navigate Indian roads using intelligent sensing and computing technologies. This highlights socially impactful research.

• **Quite OK Image (QOI) Demo**

A demonstration of modern image compression techniques and efficient encoding principles beyond traditional formats.

4. Fun Activities

• Ackinator – AI Guessing Challenge

Participants draw a chit containing a well-known entity and interact with an AI assistant by asking strategic questions to guide it toward identifying the correct answer within a time limit. Participants are scored based on successful identifications.

• Puzzle Arena

Logic-based puzzles including Tower of Hanoi, N-Queens, Graph Coloring challenges, and Cryptography puzzles designed to engage visitors of all age groups.

5. Technical Talks

Short technical talks by CSA faculty members and invited industry experts on emerging topics in AI, Cybersecurity, Algorithms, Systems, and Future Computing. The overall plan focuses on interactive participation, hands-on learning, and showcasing ongoing research activities in the department.

CENTRE FOR NEUROSCIENCE (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.

- **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 Brain Machine Interface:** Activating someone else's nerve by contracting your forearm muscle using TENS (transcutaneous electrical nerve stimulator).

- **The Self and its Brain:** Witness yourself change with Pinocchio and Rubber Hand illusions.

- **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!

- **Live electrophysiological recording:** see how neurons in a cockroach leg respond to stimuli using an in-house electrophysiology system.

- **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.

- **Light, Chemistry, and the Brain:** Let's understand how your brain circuits decode pain and itch using optogenetics.

- **Tweaking your brain:** How to change your behaviour with magnetic brain stimulation.

- **Visual Illusions:** Come learn why there's more to vision than meets the eye!

AEROSPACE ENGINEERING (AE)

Have you ever wondered how airplanes stay in the air, how rockets reach space, or how engineers test machines that travel faster than sound? Visit the Aerospace Engineering Open Day to explore these questions in a fun and simple way!

See real drones and aircraft models, along with models of ISRO's launch vehicles and the Gaganyaan mission. Watch live demonstrations of shock waves and flow visualization, learn how aircraft structures are monitored for health and safety using acoustic emission and infrared thermography, and discover how vibrations and aerodynamics affect flight. Observe real UAV platform to understand how design, aerodynamics and control come together in real world aerial systems.

Enjoy exciting science experiments like the Whoosh Bottle, Whirling Flame, Rubens' Tube, and vortex ring generators that make learning both visual and interactive.

Meet our students and researchers, ask questions, and see how classroom ideas turn into real aerospace technology. Come experience the science of flight up close!

Overall, there will be 13 exhibits in the AE main building from various labs in the department, the low-speed wind tunnel and shock waves and hypersonic laboratories will be open, and a kids' zone event will be showcased.

MATHEMATICS (MA)

Activities

1. LLM Visualization
2. Four color theorem demonstration
3. Pick's theorem
4. Benford's law
5. Quiz
6. Games
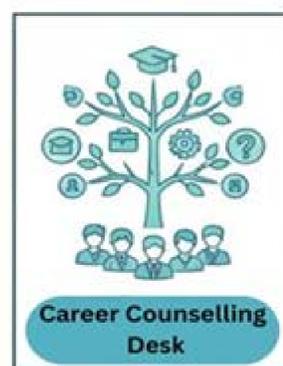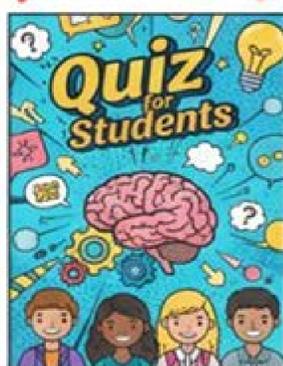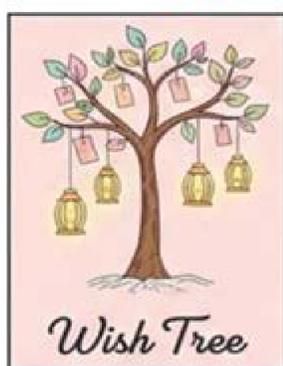
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CENTRE FOR EARTH SCIENCES (CEaS)

Displays

1. Minerals on a Journey: from Core to Crust

We will display a layered model of the Earth showing the core, mantle, and crust, along with representative mineral and rock samples from different depths. Images and Videos of thin sections of selected samples will also be displayed on a projector.

2. Glacio-Isostatic Adjustment: Linking Climate Change to Deep Earth

This exhibition will explore the impact of large land-based glaciers on the interior of the earth.

3. From Space to the Deep Earth: How Meteorites, Magma, and Minerals Tell the Story of a Planet:

This exhibition aims to introduce school students to the fascinating journey of rocks, from their origins in space to their formation deep within the Earth. By combining planetary science, magmatism, mantle dynamics, and mineralogy, the exhibit will highlight how scientists study Earth and other planetary bodies using rocks, minerals, and their chemical signatures. The goal is to spark curiosity and to demonstrate how fundamental Earth processes are interconnected across different scales, from the Solar System to the Earth's mantle.

4. Imaging the Subsurface: Seismic Images of the Underground World

This exhibition will demonstrate how seismic waves can be utilized to image the underground world.

5. Foraminifera: Chronicler of Past Climate

This exhibition will demonstrate how the tiny, microscopic organisms like foraminifera can record the climate of the past.

6. Ocean Acidification: How CO2 is making the Oceans Acidic

This exhibition will explore how the rising CO2 concentrations in the atmosphere is causing a rise in seawater acidity.

7. Mysteries of the Deep Earth:

We present simple demonstration of natural convection in a rotating annulus, the formation of vortices in shear layers — the Kelvin-Helmholtz Instability, and the Lorentz force in Earth's core via a MHD boat.

8. Ice Cream with Liquid Nitrogen!

UNDERGRADUATE PROGRAMME (UG)

QUARKS Club

Experiment Name	Description
Demystifying lab	A game where people will have to figure out what the researcher is trying to achieve in the lab by looking at a phone
Find out the real name of	A game where people will have to find the real name of the writer by checking our blog
UG's artistic display	Various Poetry, Photographs, Artworks, Writing Pieces
Posters	Showcasing UG life at IISc
A Day	Reels of a day in the life of UG
Pseudoscience vs Science	Live Dialogues with crowd engagement
Scientific methods using examples	Live Dialogues with crowd engagement
Rememberall	Showcase the previous year's magazine

GEOLITES Club

Experiment Name	Description
The Rock cycle and identification of rocks and minerals	Explaining the stages of the rock cycle using real samples of igneous, sedimentary, and metamorphic rocks along with minerals
A Hidden world beneath the microscope	Examining optical properties under polarizing microscope to interpret rock composition
Does clear equal potable	Evaluating whether clear water is safe for consumption through tests of pH and electrical conductivity and other parameters
Working Principle of a Seismometer	Understanding how seismometer detects and records ground vibrations
Dynamics of ocean circulation	Explains how temperature and salinity differences create density-driven currents and internal waves inside the ocean

SAMASYA Club

Experiment Name	Description
Weak Law	A demonstration of Weak Law of Large Numbers, along with a simulation
Chaotic systems	A simulation of chaotic systems, such as Lorenz attractors
Fractals	A stall on fractals
Lemma	A stall on Sperner's Lemma and Fair division algorithms
Parity	Puzzles/magic tricks based on parity
Games	Two interactive games
Proofs	A stall on False Proofs

DATABASED Club

Experiment Name	Description
Agar-ithm	It is a multi-agent spatial simulation where players allocate limited resource points to evolve bacterial colonies and compete for survival in a real-time digital arena

Gesture-Based Game Control	This exhibit is a gesture-controlled game where visitors drive the action just by moving their hands in front of a webcam
Bezier Curve	A drag control play demo of Bezier curves that reveals how smooth shapes in art, animation, and games are built from simple mathematical rules
Voronoi Diagrams	This interactive game challenges visitors to find the spot on a map that maximizes the distance from other markers, effectively visualizing how Voronoi diagrams partition space
ASCII Art	An exhibit that snaps a photo of visitors and instantly renders it as ASCII art by mapping pixel luminance values to specific characters based on their visual density

AI Hallucinations	A reality check on AI that shows how language models can confidently fail at basic tasks, helping visitors understand AI limitations
Sorting Algorithm	A visual race between inefficient and optimised algorithms (on CPU and GPU), showing the importance of the time complexity of algorithms on large datasets
Live Coding	Making music with code! get into the world of bizarre sounds of Synthesiser and ORCA, an esoteric programming language for making music
Minecraft as a Programming Language	This exhibit dives into the Turing completeness of Minecraft, using Redstone to build functional logic gates and circuits

De-pixelating Images	This project demonstrates that naive image obfuscation methods like pixelation are reversible under certain conditions. By exploiting deterministic averaging in box filters, we can reconstruct the hidden plaintext. It highlights a realworld security risk in digital redaction practices

NATURALISTS Club

Experiment Name	Description
The DNA World	Understand the molecule that codes our existence through X-ray diffraction of a helix, live DNA extraction, and a DNA Model
2 lies, 1 truth	Learn a science story through an interactive, multiple-choice game
Fluorescent agar art	Admire art drawn using bacteria on agar, except the bright color is revealed only under UV light

Operation Outbreak	A virus infection simulation based on the movement of visitors
PACMAN Macrophage game (Not a stall)	A QR code containing the classic PACMAN game with a twist, you are a bacteria running away from the host macrophages
Build a Virus! (Game)	Use the building blocks of a virus to customize your own
Reaction Diffusion Model	A mathematical simulation that explains pattern formation in nature through the interaction of substances that react and diffuse across a surface
Ecological Interactions Model	A mathematical simulation that studies the interaction of various species in an ecosystem
Mega Plate model	A mathematical simulation of bacterial colonies growing in an antibiotic concentration gradient accompanied by a physical mega plate

Antigen-Antibody Interactions	A puzzle-like game demonstrating the specificity of antigen-antibody interactions
Fungi wars	Studying the interactions of two fungi as they compete for resources
Optical illusions	Optical and auditory illusions that trick your mind
Microscopy	Get a glimpse into the tiny, diverse world of microbes
Chemoattraction	Demonstrating movement of beetles upon introduction of chemoattractant molecules
Ecological specimens	Preserved insect specimens and a terrarium showcasing natural diversity
Evolution and Physiology	Explaining evolution through the morphology of artificial bones

ENSEMBLES Club

Experiment Name	Description
Meissner Effect	Watch as we levitate a mysterious superconductor into the air. How? Just add liquid nitrogen!
Rotating Turntable	See a ball roll on a turntable and reveal how rotations, rhythms, and chaos unfold.
Curie Temperature	Heat a nickel rod until it decides ferromagnetism is out and paramagnetism is in!
Barberpole Effect	Pass polarized light through sugar water and watch colours twist as the chiral molecules have their own psychedelic dance party.
Specific charge of electron	Bend the electron beam by simply adjusting the magnetic field, and find out its most fundamental property - the specific charge.

Lenz Law	When magnets seemingly start "defying gravity" while falling through copper tubes, is it due to withcraft at play, or eddy currents?
Rolling Frustum	Watch how a frustum behaves when rolled, and connect it to wheels on real train tracks!
Simulations	Find out what all the theory and equations in physics actually look like.
Particle Detection using GM tube	Detect cosmic particles on the standard model using a not-so-standard particle detector!

CATALYST Club

Experiment Name	Description
Fluorescent nylon synthesis	Watch out for fibers which materialize out of water! But here's the catch, these tangled threads glow in the dark, too!

Chemilumi-nescence	Who knew mixing of potions can give us light? Witness the exciting phenomena of chemiluminescence
Electrochemical deposition in a petri dish	Look out for shiny metal "crystals" that form from a mysterious, wicked liquid!
Traffic light reaction	Watch the different colors of a traffic light in a beaker! Find out more about the intriguing chemistry behind it.
Thermally activated delayed fluorescence	Observe the seemingly innocent powder change color after being dipped in liquid nitrogen!
Electrolysis with universal indicator	Watch out for the vibrant color gradient which ends in a satifying swirling pattern, all due to a magical liquid!
Tricolor reaction with chromium pentoxide	Three distinct colors in a single test tube? Marvel at the beauty of Chemistry, as it manifests as yet another beautiful reaction!

Maxwell's Demon game	Can you defeat the fundamental law of the universe? Are you worthy of fulfilling the demon's futile dream of overthrowing the very fabric of reality? Come find out!

AMALGAM Club

Experiment Name	Description
Cryogenic Icecream	Liquid Nitrogen: 2 demos. Ice-cream production and Glass transition of rubber following undercooling
Bismuth Crystal	Peculiar morphology of a Bismuth crystal and the role of grain growth mechanisms for the same
Electroplating	Electroplating using a copper salt solution
Shape Memory Effect	Activities using shape memory alloy (writing your own name or bending it into some interesting shape), submerging it in hot water finally to gain its original shape

Electroetching	Electro etching using a current probe

VICHARAKA Club

Experiment Name	Description
Autonomous Tightrope - Balancing Unicycle	This unique "unicycle" robot must navigate a rope strung between two anchor points. This project is inspired by the open-source community's work on reaction wheel systems
Ball Balancing Platform	Three motors are arranged in an equilateral triangle configuration below the platform. Positional data from the touchscreen is sent to a set of motors underneath the platform to execute corrective movements, preventing the ball from rolling off

Smart Mirror	A mirror that will reflect only when you are smiling. The mirror will be controlled by a detector and reflector with arduino for face recognition. Computer vision is harnessed to detect the smile.
Hammer of Thor	It is an interactive exhibit designed to demonstrate the principles of electromagnetism and radio-frequency identification (RFID). "Thor's Hammer" remains immovably fixed to the ground for the general public but can be effortlessly lifted by an "authorized" (worthy) user wearing RFID ring.
AI Vision Based Tracking Turret System	This project presents a safe and educational computer-vision based tracking turret system. The system automatically detects and follows a remote control helicopter or small flying object using a fast global-shutter

	camera and real-time control electronics. A low-power Class-2 LED/laser pointer is used only as a visual indicator to show where the system is aiming.
Musical Tesla Coil	The Musical Tesla Coil, often called a Singing Tesla Coil or Zeusaphone, doesn't just create dramatic electrical arcs, but uses those arcs to play audible music. This involves modifying a standard coil to modulate its output, essentially turning the high-voltage discharge into a massive, open-air plasma speaker
Van De Graph Generator	The Van De Graaff Generator is an electrostatic machine designed to produce very high voltages using a moving insulating belt that transfers charge to a hollow metal dome. It demonstrates the

	fundamental principles of electrostatics, charge accumulation, and electric field formation through spark discharge and electric field effects. High voltage with extremely low current makes it inherently safe.
Rover	The rover is a highly modular platform with low center of gravity. It has differential rocker-bogie suspension mounted on six-wheels enabling maneuvering rugged terrains with slopes up to 50°. Power train includes a high-torque planetary-geared DC motors which is powered by a custom STM32 with closed-loop PID motor control. Its autonomy stack is built on ROS 2 and leverages visual-inertial odometry, RGB-D SLAM, and real-time obstacle avoidance for

	robust navigation without reliance on satellites. A layered communication architecture combines high-bandwidth RF telemetry with hardware manual override, making the rover a complete demonstration of mechanical design, embedded systems, perception and autonomous robotics.
Robotic Arm	The robotic arm is a high-precision, six-degree-of-freedom articulated manipulator designed for autonomous and tele-operated interface for real-world objects. Capable of lifting payloads up to 8 kg at a full extension of 1.4m, the arm uses harmonic drives and closed-loop stepper motors to achieve high positional accuracy. All structural components are optimized through extensive finite-element analysis to balance strength and weight. STM32 runs micro-ROS, with joint-level communication over a

Experiment Name	Description
	CAN bus, while higher-level motion planning, inverse kinematics and collision avoidance are managed by a ROS 2 computer using MoveIt 2. Vision-based perception enables precise grasping and manipulation tasks either standalone or as a part of rover

ASTRAE Club

Experiment Name	Description
Poster Presentations	a. Multimessenger Astronomy b. Stellar Evolution c. Cosmic Microwave Background d. Solar Observation e. Astrophotography f. Eclipses
Models	a. Telescope for Astrophotography and Solar Observation b. Radio Telescope c. Eclipse/Lunar Model d. Spectrometer e. Interferometer f. Evolution of Telescope Design

PPT Presentations	a. Universe Sandbox b. Stellar Evolution

KID's Zone

Experiment Name	Description
Bicycle Wheel Gyroscope	Feel the precession of a gyroscope by becoming one with it
Electric Field Breakdown	Observethesparksflyaswe exceed the threshold of potential
Roller Coaster	Study the conservation laws with our model roller coster experiment
Thermo-Chromaticity	Modulating temperature to show colour changing properties of thermochromic material
Comet Demo	Learn about the features of a comet through our demo
Trivia	Quiz for kids

QUIZ Club

Experiment Name	Description
Quiz Contest	Step up, test your knowledge, and challenge your curiosity at our Quiz club! From surprising facts to brain-teasing questions, every answer unlocks something new.

BOOK Club

Experiment Name	Description
Where stories come alive	A celebration of unforgettable characters, thought-provoking conversations, and the magic that happens when readers come together.

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MANAGEMENT STUDIES (MS)

- **Management Quiz:** A quiz on general awareness of management studies.

- **Live Auction:** An interactive bidding game.

- **ChocoQuest:** The Chocolate Factory Adventure (Learn about business management).

- **Walk of Fate:** Probability-based games.

- **Card Color Challenge:** A fast-paced probability game guessing the next card's color.

Mphasis Research Lab for Sustainable Solutions

The Mphasis Research Lab for Sustainable Solutions is a research lab under the Department of Management Studies at the Indian Institute of Science (IISc), Bangalore, India. Established in April 2025 in collaboration with the Mphasis F1 Foundation, the lab focuses on advancing knowledge, technology, and real-world solutions to address challenges in sustainability and financial inclusion.

This interdisciplinary lab explores a range of critical areas of social good through science, technology, and innovation. For IISc Open Day 2026, the lab has planned a series of engaging games and activities, here's a glimpse!

1. FinFin Quest

Level up your money game through a series of interactive challenges designed to strengthen your financial know - how and decision-making skills.

2. Risk Snakes & Resilience Ladders

An innovative twist on the classic game of snakes and ladders. An interactive game exploring health, nutrition, and livelihood challenges faced by everyday workers—navigate instability, build resilience, and climb toward well-being.

3. FRANDly AI

Discover the world of AI and FRAND—unravel clues, solve challenges, and piece

together the puzzle of fairness, access, and innovation in the digital age.

4. Hive Minds

Witness live demonstrations of behavioral studies on honeybee species like Apis cerana and Apis florea, uncovering how their intricate behaviors sustain ecosystems, support biodiversity, and contribute to a more sustainable future.

All are welcome! Exciting Prizes Await!

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CENTRE FOR BRAIN RESEARCH (CBR)

The Centre for Brain Research (CBR) was established through a generous endowment from the Pratiksha Trust, co-founded by Mr Kris Gopalakrishnan and Mrs Sudha Gopalakrishnan. CBR conducts multidisciplinary research on the aging brain and age-related brain disorders such as Alzheimer's disease and Parkinson's disease. The overarching goal is to enable early diagnosis, prevention, and effective interventions.

CBR will present an engaging glimpse into the science of the aging brain through interactive exhibits and research insights. Highlights include displays of an actual human brain alongside mouse brain models to illustrate brain structure and function. Visitors can also explore, among other concepts, cerebrovascular health and learn about risk factors for vascular dementia. Interactive elements, such as real-time brain activity recordings using a headband EEG setup and a DNA-themed game, provide opportunities for guided exploration. This experience will be complemented by a quiz session related to brain and aging.

Informative posters will showcase CBR's ongoing longitudinal cohort studies in urban and rural aging populations, as well as molecular neuroscience and computational research projects. These displays collectively reflect CBR's integrated approach to research, outreach, and knowledge sharing in the field of brain aging.

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CENTRE FOR HIGH ENERGY PHYSICS (CHEP)

Demonstrations

- Underground detection of dark matter
- Catching cosmic rays in a flask
- Cosmic Watch detector
- 3D-printed Large Hadron Collider detector
- Gravitational microlensing on a table top

Videos

- How to build a universe: the Standard Model
- Higgs mechanism
- Why the vacuum is not really empty
- Particle Fever

Quiz

Particle physics quiz:
- 11.30 am—12.00 noon
- 4.30 pm — 5.00 pm

Posters

- A new formula for π from string theory
- What is quantum gravity?
- The Standard Model
- Puzzles beyond the Standard Model
- Latest findings in fundamental physics
- Dark Matter

Handouts

Crosswords and puzzles

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CENTRE FOR INFECTIOUS DISEASES RESEARCH (CIDR)

Professor Amit Singh Lab

1. **TB Awareness Photobooth**
   - Creative cartoon representations of TB awareness and antibiotic treatment.
   - Designed to engage a diverse age group with fun and educational elements.

2. **Quiz & Spinning Wheel**
   - Quiz questionnaire covering:
     ‣ TB awareness
     ‣ General microbiology concepts
     ‣ Immune cells
     ‣ Mycobacterium species
   - Spinning wheel game to reinforce key facts.

3. **Granuloma Puzzle**
   - 3D model puzzle where participants arrange components to form a complete granuloma.
   - Includes immune cells and blood smear references for guidance.

4. **Microbiology & Immunology Hands-on Activities**
   - **Pipetting Techniques** – Using phenolphthalein indicator.
   - **Alamar Blue Assay** – Understanding bacterial viability.

- **Streaking Techniques** – Using tdTomato and eGFP bacteria.
- **Agar Plate Design** – Artistic bacterial growth.
- **roGFP2 Assay & FACS** – Demonstrating bacterial heterogeneity.

5. **Infectious Disease Awareness Section**

- HIV Virus Model – Interactive learning.
- Quiz Questionnaire – Covering HIV, HMPV outbreak, and COVID-19.

6. **TB Awareness Board Game**
- Participants move on a game board based on dice rolls.
- Certain positions include messages on antibiotic adherence and TB prevention.
- Landing on negative scenarios (e.g., non-adherence) results in setbacks.

7. **Lung Function Test Game**

- Interactive game where participants control their breath duration.
- Display of lung health status on a TV screen or poster based on results.

8. **Awareness Merchandise**
- Wristbands with punchlines – Designed by Isheta on glossy paper.

9. **Prizes & Tokens of Appreciation**
- Petriplates with stickers as souvenirs for participants.

Professor Shashank Tripathi's Lab

Emerging Viral Pathogens Lab

Poster Presentations

1. **Basic Introduction to Viruses**
   Classification, morphology, genome organization, and host specificity.

2. **Influenza Pandemics & Epidics**
   Understanding antigenic drift and antigenic shift in Influenza A virus and their role in global outbreaks.

3. **Vaccines, Antivirals, and Antibiotics: Why the Differences Matter**

   Mechanisms of action, targets, and the importance of rational therapeutic use.

4. **Viruses and Their Vectors**

   Overview of transmission routes including airborne, vector-borne, contact, and zoonotic spread.

Interactive & Hands-on Activities

Display of Virological Techniques

- **Plaque Assay Demonstration –** Quantification of infectious viral particles.
- **Hemagglutination Assay** – Principle, methodology, and applications in viral detection and characterization.

Virology-Themed Games

- **"Match the Virus"** – An engaging activity linking viruses with their structural features, genome type, and associated diseases.

General Quiz

- Covering fundamental virology concepts, emerging viral pathogens, and recent scientific discoveries.

Professor Vidya Mangala Prasad Lab

A. Poster Presentations

1. **Structural Virology**

   A basic introduction to the structural organization of different types of viruses.

2. **Negative-Stain Transmission Electron Microscopy (NS-TEM)**

   This poster will explain the principle behind negative staining. Representative NS-TEM images of viruses will be displayed to demonstrate morphology and size.

3. **Visualization of Viruses Using Cryo-Electron Microscopy (Cryo-EM)**

   An overview of cryo-EM sample preparation, including vitrification, and how cryo-electron microscopy enables

high-resolution structural determination of viruses.

B. Live Demonstration Stations

1. NS-TEM Sample Preparation

A step-by-step demonstration of sample preparation for NS – TEM using safe, non-infectious materials.

2. Plaque Assay Demonstration

Display of plaque assay plates showing clear plaques, with a brief explanation of plaque formation due to virus-induced cell lysis and how viral titer is calculated.

3. Clay Modelling of Viruses

Participants will create 3D clay models of different viruses based on reference structures.

C. Virology-based quiz/games

1. Viro-vocab
2. Snake and ladder game to promote awareness and safety against viruses

Open Day – BSL-3 Lab

- **Specimen:** Formalin fixed specimens of TB granuloma will be displayed on a table. Specimens for display from different species of animals can be procured with

approvals from Veterinary College and human lung specimen from MSR/St. John's hospital.

- **PPE mannequin:** Place the mannequin with all PPEs for showcasing.

- **LED video display:** A video can be made in collaboration with students to show the entry procedure, covering the different labs of bacterial BSL- 3. The video can be displayed on a LED TV.

- **Board game:** An awareness board game (like snake and ladder) can be designed in collaboration with students to create awareness among public about biosafety and infectious diseases.

- **Souvenirs:** Stickers of CIDR and BSL-3 laboratories can be printed and given as souvenirs to public.

INORGANIC AND PHYSICAL CHEMISTRY (IPC)

Experiment Name
- The DIY Stylus Challenge, and Indicating electrolysis
- Sodium Acetate Crystals Experiment
- Fake blood experiment

- Nitrocellulose
- Colour changing electrode experiment
- Daniel cell
- Dancing liquid (ferrofluids)
- Visualizing magnetic fields with ferrofluid
- Fluroscence Protein Art and DNA extraction
- Colour magic of Ag nanoparticles
- Chemiluminescence with diffusion
- Polarization & Light-Scattering Demonstration
- Chromatic Shadow Conspiracy
- Laser Reflection Maze
- Fluroscence Microscope still model
- Colour magic of copper sulphate
- Magic window
- Nylon rope trick
- Golden Rain Experiment & Fingerprint extraction
- Neon Tornado Show
- Invisible ink experiment
- Leyden Jar Experiment

CHEMICAL ENGINEERING (CE)

Prof. Nirmalya Bachhar

Volunteers: Zeshan Hossain Sardar (PhD), Sangepu Abhinav (MTech)

Molecular Engineering of Drug Molecule

In modern medicine, computational chemistry plays a major role in engineering drug molecules. We plan to demonstrate one of these techniques, which was developed in our lab.

Prof. Venugopal Santhanam

Volunteers: P H Sai Siddharth (PhD), Ananya Shetty (MTech)

Demonstration of Printed Nanostructures

In current scenario, there is an active need for low-cost, conductive thin films and substrates which have a wide range of applications, like in the field of sensing and electrochemistry. We wish to demonstrate our in-house fabricated silver nanostructures on paper substrates and some of their applications.

Prof. Rahul Roy

Volunteers: Nishtha Mathur (MTech(I)), Vishnu D Anand (MTech(I)), Shivathmika (MTech (II)), Vinay Pali (MTech (II))

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. Debashis Roy

Volunteers: Subhradeep Debnath (PhD), Apoorva Hembram (PhD)

Dye degradation using photocatalysts

It will be demonstrated by irradiating a colored dye solution containing a photocatalyst under UV or visible light. The progressive decrease in dye coloration, observed either visually or quantified using a UV–Vis spectrophotometer, indicates the photocatalytic decomposition process.

Prof. V Kumaran

Volunteers: Gautam Singh Majila (PhD), Udaya Kiran

Marangoni instability

In Marangoni effect fluid flows from regions of low surface tension to high surface tension, and if that flow feeds back on itself, the interface becomes unstable patterns, cells, or ripples appear. The sample required are any surfactant, ethanol, SDS.

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: Chiranjit Dutta (PhD), Suresh Tejaram 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: Mankala Karthik (Mtech), Chekuri Sushma (MTech)

Shear Thickening (Cornstarch Suspension)

This experiment demonstrates the shear-thickening behaviour of a cornstarch–water mixture. The material flows like a liquid under gentle motion but becomes rigid when subjected to sudden force, showing how suspensions can transition between fluid-like and solid-like states.

Kaye Effect

In this experiment, a thin stream of a common shear-thinning liquid such as shampoo is poured onto a surface, where it unexpectedly jumps and forms a secondary jet. This visually striking effect demonstrates how fluid viscosity can change under flow.

Prof. Sanjeev Kumar Gupta

Volunteers: Vimal Ruhela (PhD), Vivek Ojha (PhD)

Kelvin Water - drop Electrostatic Generator

The Kelvin Water-Drop Electrostatic Generator was invented by Lord Kelvin in 1867 and is used to produce high voltage

electricity using falling water drops. It works on the principle of electrostatic induction, where tiny charges formed on water droplets cause charge separation in nearby metal collectors. As water continues to flow, the charges keep increasing and create a large voltage difference between the two collectors. This high voltage can produce small sparks and crackling sounds. The experiment does not require any batteries or external power source and helps demonstrate the basic concepts of static electricity and charge generation. You won't want to miss it.

Detection of Potassium in Soil Using Turbidity-Based Precipitation Method

This project focuses on quantifying extractable potassium in soil through extractive precipitation and turbidity measurement. Water-soluble potassium is first extracted from soil by mixing with de-ionized water, followed by filtration to obtain a clear aqueous extract containing dissolved K^+ ions. A known excess of sodium tetraphenylborate reagent is then added, causing a stoichiometric precipitation reaction that forms insoluble potassium tetraphenylborate particles.

The suspended precipitate produces turbidity, the extent of which is directly

proportional to the potassium concentration originally present in the soil. Turbidity is converted into a measurable physical parameter using a calibrated visual turbidity column, where the height at which a reference mark disappears corresponds to potassium level. Thus, the method integrates solid–liquid extraction, controlled precipitation, and optical measurement for simple, fieldapplicable soil potassium detection. Don't miss out on the fun!

Prof. Bhushan Toley

Volunteers: Ramandeep Kaur (PhD), Vaishnavi Gupta (MTech), Ayyaswamy Ramyasree (MTech)

Guiding and Dividing Fluids on Paper for Diagnostic Applications:

Paper-based microfluidics enables low-cost, pump-free diagnostics by harnessing capillary-driven flow in porous substrates. Through controlled fluid routing and sample splitting, complex analytical workflows can be embedded directly into paper architectures. This demonstration illustrates how simple geometric design allows autonomous liquid transport and parallel testing from a single sample, reflecting the principles used in point-of-care diagnostic devices for resource limited settings.

Prof. Ananth Govind Rajan

Volunteers: Manasi Ganesh Lavhekar (PhD), Anusha Tripathi (PhD)

Filtration: Creating a separation/filtration of water setup for demonstrating the importance and mechanism behind reverse osmosis water separation technique. We have created a simple, interactive demonstration of the filtration mechanism. We will also show molecular dynamic simulations done in our lab to help the audience visualize how a nonoporous membrane helps in the filtration of water in the process.

Prof. Narendra M Dixit

Volunteers: Abhay Sharma (MTech), Vinith (MTech)

Maximal human lifespan in light of a mechanistic model of aging

We make a mechanistic link between cellular damage, survival curves, and maximum lifespan using a validated stochastic model of damage accumulation and extensive human data. We show that maximal lifespan is set mainly by damage production and clearance rates. In contrast, lifestyle factors such as exercise, nutrition, and sleep chiefly reduce stochastic noise and raise the damage level compatible with survival,

shifting the median but not the maximum. We wish to demonstrate how the lifestyle factors influence the average life expectancy using an interactive simulation.

COMPUTATIONAL AND DATA SCIENCES (CDS)

Events of CDS at #102 and CDS Lawn

1. 10:00 – 10:15 AM
   Opening Remarks

2. 10:15 – 11:00 AM
   Keynote 1

3. 11:00 – 12:00 PM
   3-Minute Thesis Competition

4. 12:15 – 1:00 PM
   Quiz for School Students

5. 1:45 - 2:30 PM
   Open Quiz

6. 2:45 – 3:15 PM
   ATCG Games

7. 3:15 – 4:00 PM
   Debate

8. 4:00 – 4:30 PM
   Felicitation Ceremony

BIOENGINEERING (BE)

S.No.	Model name
1	Mechanoenvironment Model of Tumor tissue and normal tissue
2	4D bioprinting
3	Wound Healing; Durotaxis
4	Waddington Landscape,
5	Enhanced Permeation and Retention (EPR) effect
6	MRI fruit scanner using Arduino and proximity sensor, match-the-MRI-with-Human-body-part
7	Neutrophil model and diabetes
8	Immunity Pin Ball Game
9	Target the Tumor

INTERDISCIPLINARY CENTRE FOR WATER RESEARCH (ICWaR)

Exhibitions

• This year's open day brings together a wide number of research demonstrations and working models, with a strong focus on water, sustainability and the ecosystem.

• We will showcase how coastal ecosystems like coral reefs, seagrass, and mangroves

protect our shorelines, how remote sensing and satellite data are being used to forecast floods and monitor groundwater, and how smart IoT sensors are transforming water treatment and quality monitoring.

- There will be exhibits on 3D visualizations of satellite orbits and geodesy.

- We plan live demonstrations of water in motion and its management: a Pelton turbine, a flood bypass tunnel system, and an automatic plant watering system, effective irrigation system.

- The exhibition will also cover live climate measurement using sensors and how we track the changes in air temperature through the day.

- There will be demonstration on clean water access through chemical, physical, and biological treatment methods, water quality analysis using test kits and presentation on "know your water".

- Visitors can also explore a dedicated booth on our department's research on the Cauvery River, and a career booth for those interested in pursuing water-related study fields.

- We also plan dedicated KidZone demonstrations spreading awareness

related to sustainability, games and hands-on activities related to water.

MATERIALS ENGINEERING (MTE)

Materials Engineering Open Day 2026

Materials drive innovation - from ancient metals to modern nanotechnology. At our **Materials Engineering Department**, we develop and test materials for aerospace, electronics, and biomedical devices using additive manufacturing and **AI-driven discovery.**

Join us at **IISc Open Day 2026** for a journey through the science of what makes the world.

The Fan Favorites

Can a Bulletproof Material Save an Apple?

Witness **steel pellets fired at Mach 1** toward a defenseless apple. Can a few layers of Kevlar change its fate? Watch the high-stakes impact

in **stunning slow-motion** and see how modern ballistics materials absorb massive energy in a fraction of a second.

Rainbows in Data: The Laser & CD Show

Turn everyday objects into scientific tools. By shining lasers on **CDs and DVDs**, we reveal the "hidden structure" of materials through **diffraction patterns.** Discover how the microscopic spacing on a disc creates a symphony of light and what it tells us about crystallography.

The Tin Cry – Metal That "Speaks"

Bend a cool tin bar, and it **cracks like it's crying.** This "cry" happens because the metal's atomic structure shifts through **crystal twinning.** Heat it up, and the silence returns.

Dance or Sink: The Oobleck Challenge

Can you **walk on liquid?** With oobleck, you can— if you're fast enough. This **non-Newtonian fluid** stiffens under impact but flows like water at rest. It's the same science used in **advanced body armor.**

The World of the Unseen

See the world through a **Scanning Electron Microscope (SEM).** From the thousands of tiny lenses in an ant's eye to the intricate textures of modern polymers, SEM reveals the hidden structures that define our world.

Liquid Nitrogen Ice Cream

Ice cream made in seconds? We flash-freeze ingredients at **-196°C** to prevent ice crystals from forming. The result is an **ultra-smooth, creamy texture.** It's science you can actually taste.

And That's Just the Beginning!

Explore even more hands-on demos and fascinating exhibits:

- **Shape Memory Effect:** Watch metals "remember" and return to their original shape.
- **The Meissner Effect:** Experience the magic of levitating magnets via superconductivity.
- **Thermoelectric Effect:** Watch us turn raw heat directly into electricity.
- **Color-Changing Nanocrystals:** See how chemistry meets stunning visual art.

- Ductile-to-Brittle Transition: See metals shatter like glass when frozen.
- **Live Demos:** Featuring aeronautical tech, ancient artifacts, and biomedical devices.

Get ready for mind-blowing discoveries. We'll see you there!

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MATERIALS RESEARCH CENTRE (MRC)

MRC will display all demonstration in CSB building along with OC-SSCU-IPC
List of Experiments:

1. Electronic Musical Band
2. Flame Sensor
3. Twist-angle-dependent thermal transport via machine learning
4. Light in a Bottle
5. The Glow and Gold
6. DNA Extraction from Fruits
7. Nitinol – Shape Memory Alloy for Biomedical Applications
8. The Chemical Chameleon Experiment
9. Electrochemical Water Splitting
10. Lighting LED from Lemons
11. Rainbow Fizz
12. Valentine Mojo
13. Huygens Principle in Water, light and electrons

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INSTRUMENTATION AND APPLIED PHYSICS (IAP)

Please find below a brief overview of the proposed exhibits and demonstrations for **Open Day 2026.** The exhibits are designed to be interactive, visually engaging, and scientifically appealing to visitors across all age groups.

- **OMI Lab – Optics & Micro-Fluidics Instrumentation**

  Demonstration of point-of-care diagnostic devices that integrate optics and microfluidics for rapid medical testing applications.

- **Mondal Lab – Super-Resolution Microscopy**

  Showcasing advanced imaging techniques that surpass conventional optical limits to visualize structures at the nanoscale.

- **FIST Lab – Photoacoustics and its Applications**

  Demonstration of how light-induced acoustic waves are used in biomedical imaging and sensing technologies.

- **LANSPE – Flexible Optical Colour Sensors**

  Display of flexible optical sensing devices fabricated on bendable substrates for next-generation wearable technologies.

- **Quantum Dots & Nanomaterials Lab – Colloidal Quantum Dots**

  Exploration of semiconductor nanocrystals and their applications in optoelectronics, displays, and quantum technologies.

- **Nano Scale Devices Lab – The Magic of One-Atom-Thick Materials**

  Exhibit highlighting the extraordinary properties and applications of atomically thin materials such as graphene.

- **Nanometrology Lab – Electromagnetic Levitation**

  Live demonstration of contactless levitation using electromagnetic fields to illustrate fundamental physical principles.

- **Flexible Electronics Lab – OpenWater Technology**

  Presentation of portable water purification systems aimed at sustainable and accessible clean water solutions.

- **SSD Lab – Research Overview**

  Showcase of ongoing research activities and interdisciplinary technological developments.

- **FBG Lab – Fiber Bragg Grating (FBG) Hydrophones**

  Demonstration of optical fiber–based underwater acoustic sensing technology.

- **Tera-QuaNTA Lab – Mach-Zehnder Interferometer & Quantum Phenomena**

  Demonstration of interference and nonlinear optical phenomena, including a quantum eraser experiment.

- **M.Tech Quantum Technology Stall – Wilson Cloud Chamber Demonstration**

  A live Wilson Cloud Chamber exhibit where visitors can observe visible tracks left by charged particles as they pass through a supersaturated vapor environment. This striking demonstration makes otherwise invisible radiation observable, offering a fascinating glimpse into fundamental particle and quantum phenomena.

- **SparkLab – Tesla Coil & Lie Detector Demonstrations**

  High-frequency Tesla coil display and an interactive demonstration explaining the science behind basic lie detection systems.

All exhibits are planned to maintain strong scientific appeal while remaining financially moderate, in line with Open Day guidelines.

DEPARTMENT OF ELECTRONIC SYSTEMS ENGINEERING (DESE)

Cytology Scanner for Oral Cancer Screening

Description: A compact and cost-effective cytology slide scanner designed for rapid digitisation of whole-slide samples at cellular resolution. The system integrates precision XY scanning, compact custom optics, and controlled illumination to produce high-contrast, stitchable image tiles suitable for automated analysis. It is optimised for point-of-care and resource-constrained settings, carefully balancing optical performance with mechanical simplicity. The platform is extensible toward AI-assisted cytology screening and quantitative diagnostic applications.

HFIS: Handheld Fluorescence Imaging System

Description: The Handheld Fluorescence Imaging System (HFIS) enhances surgical procedures by enabling real-time visualisation of otherwise invisible anatomical structures through immunofluorescence technology. Using Indocyanine Green (ICG) dye, which binds to proteins and remains within blood vessels,

HFIS allows surgeons to visualise subsurface vasculature, assess surgical margins, and accurately track cancer spread to lymph nodes. By illuminating ICG-containing tissues, the system provides critical information regarding blood flow, tissue perfusion, and lymphatic drainage patterns during surgery. This technology addresses three major surgical challenges: preventing unexpected bleeding, reducing wound infection risks, and ensuring complete tumour removal.

Electrical Impedance Tomography (EIT)-Based Imaging System

Description: A compact Electrical Impedance Tomography (EIT) system that images tissue by injecting small electrical currents and measuring the resulting surface voltages. From these measurements, the system reconstructs maps showing variations in internal electrical properties. Designed to be fast, low-noise, and easily integrable, it is suitable for portable and clinical diagnostic applications.

ML-Based Hardware for Gesture Recognition at the Edge

Description: This project presents a machine learning−based hardware system for real-

time hand gesture recognition at the edge. Hand gestures provide a natural and intuitive means of human–machine interaction without reliance on buttons or touchscreens. The system captures hand motion or muscle signals through sensors and processes them using a lightweight Convolutional Neural Network (CNN). The CNN automatically extracts key patterns and accurately classifies gestures. For high efficiency, the CNN is implemented directly in hardware (such as FPGA or ASIC) using parallel computation and optimised on-chip memory. By performing all processing locally, the system achieves low latency, reduced power consumption, and enhanced data privacy. Applications include prosthetic control, sign language recognition, wearable technology, robotics, gaming, and touch-free interaction systems.

Breaking Classical and Modern Cryptography Using Power Side-Channel Attacks on ChipWhisperer

Description: Side-channel attacks (SCA) exploit physical leakages—such as power consumption, timing variations, or electromagnetic emissions—to recover secret information from cryptographic

implementations rather than attacking their mathematical foundations. In the case of the Advanced Encryption Standard (AES), Correlation Power Analysis (CPA) targets intermediate computations, such as the first-round S-box output, by correlating measured power traces with a leakage model (e.g., Hamming weight). This enables recovery of secret key bytes through statistical hypothesis testing. In this setup, power traces are captured using the ChipWhisperer platform, which provides precise triggering, synchronised acquisition, and high-resolution measurements for practical hardware attacks.

CycleGAN

Description: A visual demonstration of image-to-image translation using Generative Adversarial Networks (GANs). The project showcases unpaired image translation between horse and zebra domains, illustrating how CycleGAN can convert horses to zebras and zebras to horses without requiring paired training data.

Pocket Intrusion: When Your Phone Isn't Yours Anymore

Description: This demonstration highlights how a malicious payload can silently

compromise a smartphone. Delivered through a malicious application or phishing link, the payload grants attackers remote access to sensitive data, including SMS messages and call logs. This exposure of conversations, OTPs, and contact details can enable identity theft or further infiltration, emphasising the importance of mobile cybersecurity awareness.

Robo Artist

Description: An interactive robotic system that creates real-time "Bot-Traits" of visitors using computer vision and precise motion control. The system captures facial features and translates them into artistic sketches, demonstrating the integration of vision processing and robotic actuation.

Human Follower Robot Using Thermal Camera

Description: This system detects and follows a person using a thermal sensing module that identifies body heat patterns and determines the individual's direction relative to the robot. An ultrasonic sensor continuously measures the distance between the robot and the person to maintain a safe and stable following range. The control logic is implemented on a TIVA microcontroller,

which processes sensor data in real time and drives the motors accordingly. The project demonstrates embedded system concepts such as sensor interfacing, real-time decision-making, motor control, and power management.

Come Hack Me: Learn the Tricks Before the Tricks Learn You

Description: An interactive cybersecurity challenge that invites participants to identify vulnerabilities, uncover hidden tricks, and solve security-related problems. The platform promotes awareness of common cyber threats and teaches practical strategies for staying safe online.

NoFi Band

Description: A wearable device designed to demonstrate Wi-Fi deauthentication attacks by flooding de-authentication packets to selected or all connected devices. The project highlights vulnerabilities in WPA2, where management frames are not authenticated or integrity-protected. Disguised as a wristwatch, the device functions as a stealth Wi-Fi denial-of-service (DoS) demonstrator, emphasising wireless security awareness.

PalmPilot Maze

Description: A gesture-controlled Stewart platform that allows users to navigate a ball through a 3D-printed maze by tilting their hand. A Python-based hand-tracking script estimates palm orientation in real time and sends corresponding tilt commands to a six-servo Stewart platform. As the user rotates their hand, the platform mirrors the motion, guiding the ball through the maze. The project demonstrates the integration of computer vision and parallel manipulators to create an intuitive, hands-free physical interface.

Depth Estimation Using Stereo Vision Camera

Description: This project demonstrates depth estimation using a stereo camera configuration that captures two slightly offset images. By analysing the disparity between these images, the system estimates distances to obstacles and surrounding objects, illustrating fundamental principles of 3D perception.

FirmEx – Automated Firmware Extraction Framework

Description: FirmEx is an automated and extensible firmware extraction framework

built around a custom FT2232H-based multi-interface board supporting JTAG, SWD, SPI, UART, and I²C targets. A coordinated software stack configures the required interface, controls firmware acquisition, and computes a SHA-256 digest of the extracted image for verification against known firmware databases or established golden references. By unifying multi-protocol hardware access with automated verification, FirmEx reduces manual intervention and provides a consistent, repeatable solution for firmware-level security assurance. It is particularly suited for security audits, reverse engineering, device forensics, and large-scale embedded fleet analysis.

Micro Racer – ESP32 BLE Smart Car

Description: A compact, high-performance smart mini racing car built using the ESP32 microcontroller and wireless BLE communication. The system consists of a miniature car and a dedicated handheld controller, both powered by ESP32 modules. The controller uses an analog joystick and push buttons to wirelessly control speed, direction, and special functions in real time, demonstrating embedded communication and motor control integration.

Voice-Controlled Bot

Description: An autonomous robot that acts as a home assistant and navigates based on voice commands using time-based SLAM. The system integrates speech recognition, mapping, and real-time motion control to demonstrate intuitive human–robot interaction.

Van de Graaff Generator

Description: A Van de Graaff generator produces high voltage by transferring electric charge using a motor-driven insulating belt. The belt moves between two rollers—one at the base and one at the top. At the base, a comb-like electrode deposits charge onto the belt via corona discharge. As the belt moves upward, it carries the charge to a hollow metal sphere, where another comb transfers the charge, allowing voltage to accumulate. The process continues until electrical breakdown occurs or leakage equals the charging rate. The device is widely used in physics experiments and particle accelerators.

Asynchronous Tracking Using Neuromorphic Camera for Edge Computing

Description: A neuromorphic (event-based) camera detects changes in brightness and emits asynchronous events indicating

whether local intensity has increased or decreased. Since each pixel responds independently rather than being sampled synchronously as in a conventional frame-based camera, neuromorphic cameras achieve very high temporal resolution, making them ideal for tracking fast motion.

Many prior tracking methods rely on deep learning pipelines or convert events into frames, which reduces the temporal resolution provided by the sensor. In this demo, we present a hardware-optimized asynchronous Extended Kalman Filter (EKF) that updates on every incoming event and tracks event clusters with an EKF update latency below 1 microsecond. The tracker follows a point target moving along circular and Lissajous trajectories across a wide range of speeds.

Edge AI RISC-V SoC: Flexible Hardware for Intelligent Applications

Description: The System-on-Chip (SoC) combines a lightweight RISC-V processor core with hardware-accelerated compute units to support real-time AI inference under tight power and resource constraints. By offloading computationally intensive workloads to the AI accelerator, the system achieves improved

performance-per-watt, reduced latency, and optimized memory utilization.

The architecture supports multimodal sensing and intelligent processing for applications such as audio analysis, vision systems, and future human−machine interfaces, including brain−computer interface (BCI) systems.

Live Demo: Real-Time Edge AI Gesture Recognition with Event Camera

Description: Event cameras provide significant advantages for edge robotics applications due to their asynchronous operation and sparse, event-driven output. This makes them well suited for fast and efficient closed-loop control tasks such as gesture-based human−robot interaction.

Existing event-processing solutions often lack complete end-to-end implementations, exhibit high latency, or fail to fully exploit event sparsity. In this work, we demonstrate a real-time gesture recognition system using HOMI, an ultra-low-latency end-to-end edge AI platform that integrates a Prophesee IMX636 event sensor chip with a Xilinx Zynq UltraScale+ MPSoC FPGA and an in-house developed AI accelerator.

The hardware-optimized preprocessing pipeline supports both constant-time and constant-event modes for histogram accumulation, as well as linear and exponential time surfaces. The system achieves 94% accuracy on the DVS Gesture dataset in high-accuracy configuration and supports throughput up to 1000 fps in low-latency configuration. The optimized pipeline uses only 33% of the available LUT resources on the FPGA, leaving headroom for further latency reduction, model parallelization, multitasking, or integration of more complex architectures.

Accelerated NP-Hard Optimization with Neuromorphic Ising Machine

Description: Physics-inspired Ising machines address hard optimization problems by allowing physical dynamics to naturally converge toward optimal solutions, instead of performing step-by-step computation on a CPU. When combined with neuromorphic hardware inspired by sparse, event-driven brain processing, this approach enables fast and low-power performance.

In this demo, a real-time IPL fixture is generated to optimize team travel across cities in India, reducing carbon emissions. Implemented on an FPGA, the system

efficiently computes high-quality solutions for a challenging NP-hard optimization problem.

Password Cracking Using Power Side-Channel Attack

Description: This project demonstrates password extraction using a Power Side-Channel Attack (SCA) on an STM32 microcontroller with the help of ChipWhisperer. Power consumption traces are captured while the device performs password comparison.

Data-dependent variations in power reveal information about correct and incorrect characters. By analyzing these traces, the secret password can be recovered byte-by-byte. This demonstration highlights the importance of implementing side-channel countermeasures in embedded systems.

Gimbal-Based Attitude Control Demonstrator

Description: This project presents a two-axis gimbal-based actuation platform for demonstrating attitude control principles in aerospace applications. The system enables controlled pitch and yaw motion using servo-based actuation and manual input. The modular design allows future integration of

sensors and feedback control for advanced experimentation.

Eight-Legged Theo Jansen Walking Robot

Description: This project presents an eight-legged walking robot based on the Theo Jansen linkage mechanism, demonstrating bio-inspired locomotion principles for robotic mobility applications.

The system utilizes dual motor-driven crankshafts to generate synchronized leg motion on both sides, enabling stable and efficient forward walking over flat terrain. The mechanical linkage converts rotary motion into a smooth stepping gait that mimics natural walking patterns.

100 kg Payload Octocopter Drone

Description: This 100 kg payload octocopter is designed to navigate without GPS, relying on an Inertial Measurement Unit (IMU) and a camera. Powered by 50 V lithium cells, the drone has a peak power consumption of 45 kW.

The propulsion system features custom Field-Oriented Control (FOC) BLDC drivers capable of delivering up to 120 A per motor. For ease of transport, the aluminum frame includes a folding mechanism for each arm.

Arm Exoskeleton

Description: This project presents an exoskeleton with arm-like functionality designed to perform upper-limb movements. The system integrates a lightweight 3D-printed mechanical structure, servo-motor actuation, and a microcontroller-based control unit to provide precise and anatomically consistent wrist and finger motion.

User inputs are processed in real time to regulate actuator response, ensuring smooth and reliable movement. Experimental results demonstrate improved joint mobility and dexterity, highlighting the device's potential in grip assistance and assistive technology applications.

Quantum Random Number Generator (QRNG): Is a Coin Toss Truly Random?

Description: This demo explores whether classical systems can ever be truly random. Classical physics is inherently deterministic, meaning random processes based on classical phenomena can, in principle, be predicted. True randomness arises only from quantum physical phenomena.

This project demonstrates a QRNG circuit implemented using BiCMOS logic that

harnesses quantum effects to produce genuinely unpredictable random numbers. Unlike software-based pseudo-random number generators, a QRNG provides certified randomness with applications in cryptography, IoT security, statistical testing, and gaming.

Enhancing Nanopore DNA Sequencing with Optimized Amplifier Design

Description: Nanopore DNA sequencing detects tiny ionic current changes as individual DNA strands pass through a nanopore. Each DNA base (A, C, T, G) produces characteristic current pulses that can be decoded to determine the genetic sequence. However, these signals are extremely weak and susceptible to noise.

This demo presents a custom-designed low-noise, high-gain transimpedance amplifier (TIA) that significantly enhances weak signals for accurate base identification. The system integrates low-pass filtering, analog-to-digital conversion, and automated data processing to provide a complete nanopore-based DNA sequencing platform.

Self-Consistent Physics-Based Simulation Framework for Graphene Hall-Effect Magnetic Sensors

Description: Graphene Hall-effect sensors (GHS) offer high carrier mobility and Hall sensitivity but suffer from large DC offsets and residual offset voltages that limit detection of weak magnetic fields.

This demo presents a self-consistent, physics-based simulation framework combining Finite Element Method (FEM) solving with advanced transport models, including Fermi-Dirac statistics, quantum capacitance, phonon-based velocity saturation, and ambipolar Hall coefficients. The framework supports GHS performance optimization and offset cancellation strategies and can be extended to other 2D material-based Hall sensors.

Inside the Chip: Hardware Debugging via JTAG

Description: This demonstration showcases hardware debugging using boundary scan techniques. By performing a boundary scan through JTAG, thousands of connections can be verified instantly, ensuring every pin of a microchip is correctly wired and functioning properly.

Wearable IoT Device for Gesture Recognition

Description: This wearable IoT-based gesture recognition system detects hand gestures in real time using a camera and embedded machine learning. The processed gestures are displayed on a near-eye OLED screen mounted on a spectacle design.

The system integrates camera interfacing, OLED control, and low-power edge AI processing. It serves as an assistive communication solution, enabling inclusive and intelligent human−machine interaction.

Haptics-Based Remote Robotic Surgery Using Dual Digital Twin Architecture

Description: This project demonstrates a dual digital twin architecture for haptic-based remote robotic surgery to enhance precision, safety, and situational awareness in teleoperated procedures.

To reduce latency in long-distance communication, only essential state updates and physical interaction parameters (such as position, force, and contact dynamics) are transmitted. This reduces data payload while enabling low-latency synchronization. Haptic feedback allows surgeons to perceive

interaction forces in real time for improved surgical precision.

Semantic Communication

Description: Semantic communication focuses on transmitting meaning rather than exact data symbols. It emphasizes interpreting intent and context, inspired by how humans communicate through understanding instead of raw data.

This approach reduces unnecessary data transfer by prioritizing relevant information and supports efficient communication in bandwidth-limited environments.

BLE 6.0-Based Localization

Description: BLE channel sounding–based localization estimates indoor positioning by analyzing detailed radio channel characteristics rather than relying solely on RSSI.

By exchanging structured packets between an initiator and reflector, the system measures round-trip time (RTT), phase variations, and channel responses. With multiple anchor nodes, it can achieve sub-10 cm accuracy, suitable for indoor navigation in airports, hospitals, malls, warehouses, and industrial facilities.

Data Transfer App

Description: This application transfers large amounts of data using Delay-Tolerant Networking (DTN) with a store-carry-forward mechanism. Data is divided into encrypted chunks and temporarily stored on a mobile device acting as an intermediary between sender and receiver servers.

The chunks are later verified, reassembled, and securely stored at the destination server.

AI Gesture Air Writing

Description: Air Writing Recognition is a real-time TinyML system that uses a 3-axis accelerometer to capture hand gestures and classify letters or digits using a neural network trained on Edge Impulse.

Motion data is preprocessed using spectral analysis and deployed on-device for low-latency, cloud-free inference. The system enables touchless input for assistive technology, wearable computing, and IoT applications.

Coherer Effect Demonstration

Description: This demo illustrates the coherer effect using a simple setup. Small aluminum foil balls are placed in a glass container.

When an arc lighter is activated nearby, the conductivity between the foil balls increases, completing a circuit and lighting an LED.

Digital Twin Platform

Description: This project presents a browser-based real-time virtual workspace simulating a digital twin of the department. Users can join via a web link or QR code, navigate the layout, and interact with others in real time.

The platform demonstrates distributed systems, real-time networking, and human–computer interaction concepts for academic collaboration and virtual lab experiences.

Edge AI Security & Interaction System

Description: This project demonstrates an Edge AI-based intelligent security and interaction system. It performs real-time detection using embedded vision and on-device AI inference without cloud dependency.

The system responds to detections using LEDs, display feedback, and optional IoT alerts, showcasing embedded AI integration and real-time decision-making.

FPGA-Based Brick Breaker Game Using Artix-7

Description: This demo implements a real-time Brick Breaker game on an Artix-7 FPGA using VGA output at 640×480 resolution.

The design includes paddle control via push buttons, ball physics, collision detection, brick destruction logic, score tracking, and life management. Graphics are rendered in real time without frame buffering using pixel coordinate comparisons, demonstrating digital logic and FSM-based game implementation entirely in hardware.

Gesture Control Car

Description: This wireless robotic system uses Arduino Nano 33 BLE Sense boards as transmitter and receiver. The wearable transmitter detects hand tilt using its built-in IMU and converts gestures into control commands.

Commands are transmitted via BLE to the receiver on the car, which drives DC motors accordingly. The system integrates motion sensing, embedded processing, wireless communication, and motor control for intuitive human−machine interaction.

Human Following Robot

Description: An autonomous robot that detects and follows a human using an IR sensor for distance measurement. An Arduino microcontroller processes sensor data in real time to control movement.

The robot follows when the person moves forward, stops when the person stops, and adjusts direction accordingly.

Line Follower with Object Detection

Description: This autonomous robot follows a predefined line using IR sensors and detects obstacles using an ultrasonic sensor. A microcontroller processes inputs in real time to adjust motor movement.

When an obstacle is detected, the robot stops, demonstrating autonomous navigation and sensor-based control.

Smart Robot with Bluetooth and Obstacle Avoidance

Description: A multifunctional robot built using the Arduino platform that integrates obstacle avoidance and Bluetooth control. An ultrasonic sensor detects obstacles, while a Bluetooth module enables smartphone-based control.

An L293D motor driver shield controls the motors, allowing both autonomous and manual operation modes.