ANVESHAYA 2022-2023

B.P.PODDAR INSTITUTE OF MANAGEMENT AND TECHNOLOGY

DEPARTMENTAL MAGAZINE
COMPUTER SCIENCE & ENGINEERING

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- Provide quality, modern, and research-oriented education
- Promote knowledge through research and development
- Strengthen industry–institute interaction
- Develop entrepreneurial skills in students
- Focus on sustainable and environment-friendly technologies

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- GOOD PLACEMENT OPPOTUNITIES

DEPARTMENTAL

VISION

DEVELOPING COMPETENT PROFESSIONALS IN COMPUTER SCIENCE AND ENGINEERING, WHO CAN ADAPT TO CONSTANTLY EVOLVING TECHNOLOGIES FOR ADDRESSING INDUSTRIAL AND SOCIAL NEEDS THROUGH CONTINUOUS LEARNING.

MISSION

- ENRICH STUDENTS WITH SOUND KNOWLEDGE IN FUNDAMENTALS AND CUTTING EDGE TECHNOLOGIES OF COMPUTER SCIENCE AND ENGINEERING TO EXCEL GLOBALLY IN CHALLENGING ROLES IN INDUSTRIES AND ACADEMICS.
- EMPHASIZE QUALITY TEACHING, LEARNING AND RESEARCH TO ENCOURAGE CREATIVE THOUGHTS THROUGH APPLICATION OF PROFESSIONAL KNOWLEDGE AND SKILL.
- INSPIRE LEADERSHIP AND ENTREPRENEURSHIP SKILLS IN EVOLVING AREAS OF COMPUTER SCIENCE AND ENGINEERING WITH SOCIAL AND ENVIRONMENTAL AWARENESS.
- INSTILL MORAL AND ETHICAL VALUES TO ATTAIN THE HIGHEST LEVEL OF ACCOMPLISHMENT AND PERSONAL GROWTH.

PEO's

1. GRADUATES OF COMPUTER SCIENCE AND ENGINEERING PROGRAM WILL HAVE GOOD KNOWLEDGE IN THE CORE CONCEPTS OF SYSTEMS, SOFTWARE AND TOOLS FOR ANALYSING PROBLEMS AND DESIGNING SOLUTIONS ADDRESSING THE DYNAMIC REQUIREMENTS OF THE INDUSTRY AND SOCIETY, WHILE EMPLOYED IN INDUSTRIES OR WORK AS ENTREPRENEURS.
2. GRADUATES OF COMPUTER SCIENCE AND ENGINEERING PROGRAM WILL OPT FOR HIGHER EDUCATION AND RESEARCH IN EMERGING FIELDS OF COMPUTER SCIENCE & ENGINEERING TOWARDS BUILDING A SUSTAINABLE WORLD.
3. GRADUATES OF COMPUTER SCIENCE AND ENGINEERING WILL HAVE LEADERSHIP SKILLS, COMMUNICATION SKILLS, ETHICAL AND MORAL VALUES, TEAM SPIRIT AND PROFESSIONALISM.

PSO's

1. STUDENTS WILL HAVE PROFICIENCY IN EMERGING DOMAINS LIKE ARTIFICIAL INTELLIGENCE, DATA SCIENCE AND DISTRIBUTED COMPUTING TO DEVELOP SOLUTIONS THROUGH INNOVATIVE PROJECTS AND RESEARCH.
2. STUDENTS WILL HAVE CAPABILITIES TO WORK IN SYNERGIZED TEAMS TO CATER TO THE DYNAMIC NEEDS OF THE INDUSTRY AND SOCIETY.

ACKNOWLEDGEMENT

We express our sincere gratitude to the Head of the Department, respected faculty members, and all teachers of the Computer Science & Engineering Department for their constant guidance, encouragement, and support in the successful completion of this departmental magazine.

We extend our heartfelt thanks to the Editorial Board and Quality Assurance Committee for their valuable supervision, suggestions, and efforts in maintaining the quality and standard of this publication.

We are deeply thankful to all the students who contributed articles, poems, technical write-ups, artwork, and creative ideas, which have added depth and vibrancy to this magazine.

We also appreciate the dedication, teamwork, and commitment of every member involved in the planning, designing, editing, and compilation process.

Finally, we convey our gratitude to everyone who directly or indirectly contributed to making this magazine a meaningful and successful publication.

A NOTE BY THE HEAD OF DEPARTMENT

Chief Advisory

– Dr Ananya Kanjilal

The true success of any department is reflected not only in the quality of education imparted to its students, but also in how effectively they apply their knowledge in practical life. Along with academic excellence, the holistic development of students is equally important, as it nurtures creativity, confidence, leadership, and social responsibility.

It gives me immense pride to witness the continuous efforts of the Computer Science & Engineering Department in encouraging students to explore and develop their hidden talents beyond the classroom. Such dedication towards the all-round growth of every student is beautifully reflected in our annual departmental magazine, Anvaya.

This magazine stands as a platform where innovation meets imagination, allowing students to express their technical knowledge, literary skills, and creative ideas. The quality of content, enthusiasm, and originality presented in this edition truly make us proud.

I congratulate all the students, faculty members, and the editorial team whose sincere efforts have made this publication possible. I extend my best wishes for the grand success of Anvaya 2022-23 and hope it continues to inspire many more achievements in the years to come.

Dr. Ananya Kanjilal
Head of the Department
Computer Science & Engineering

CHIEF ADVISORY

MR. SIBASIS SENAPATI

Anvaya reflects the innovation, dedication, and creativity of our students beyond academics.
I appreciate every contributor whose efforts have made this publication meaningful and inspiring.

EDITOR – IN – CHIEF

MS. AYESHA ALI

This magazine is a wonderful platform for students to express their technical ideas and creative talents.
I congratulate the entire team for presenting such a commendable edition of Anvaya.

MS. PRIYANKA GOSWAMI

The success of this magazine shows the strength of teamwork, discipline, and enthusiasm within our department.
My best wishes to all students and faculty members for this excellent publication.

“

STAY INSPIRED. NEVER STOP CREATING.

SAJAL KUMAR GHOSH

EDITORIAL TEAM

ANUBHAV SHARMA

PAYEL PAL

“

STAY INSPIRED. NEVER STOP CREATING.

AKANKSHA KUMARI

EDITORIAL TEAM

ISHITA SENGUPTA

NAVONEEL DEY

CSE
ANVAYA

DON'T MISS OUT

ARTICLES BY STUDENTS

BEYOND BOUNDARIES, TOWARDS EXCELLENCE

INNOVATION

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Beyond Scripts: LLMs and the Next Shift in Software Testing

TRANSFORMING SIMPLE REQUIREMENTS INTO EFFICIENT AND AUTOMATED TESTING WORKFLOWS

- NAVONEEL DEY(1st year)

Software testing has long been a critical yet resource-intensive phase of the software development lifecycle. Traditionally, testers manually design test cases, execute them, and validate outputs—a process that is not only repetitive but also prone to human oversight. As modern applications grow increasingly complex and release cycles become shorter, conventional testing approaches struggle to keep pace. In this evolving landscape, Large Language Models (LLMs) are emerging as a transformative force, introducing intelligent automation and redefining how software quality is ensured.

"Automation applied to an efficient operation will magnify the efficiency." — Bill Gates

The Rise of LLMs in Software Testing-

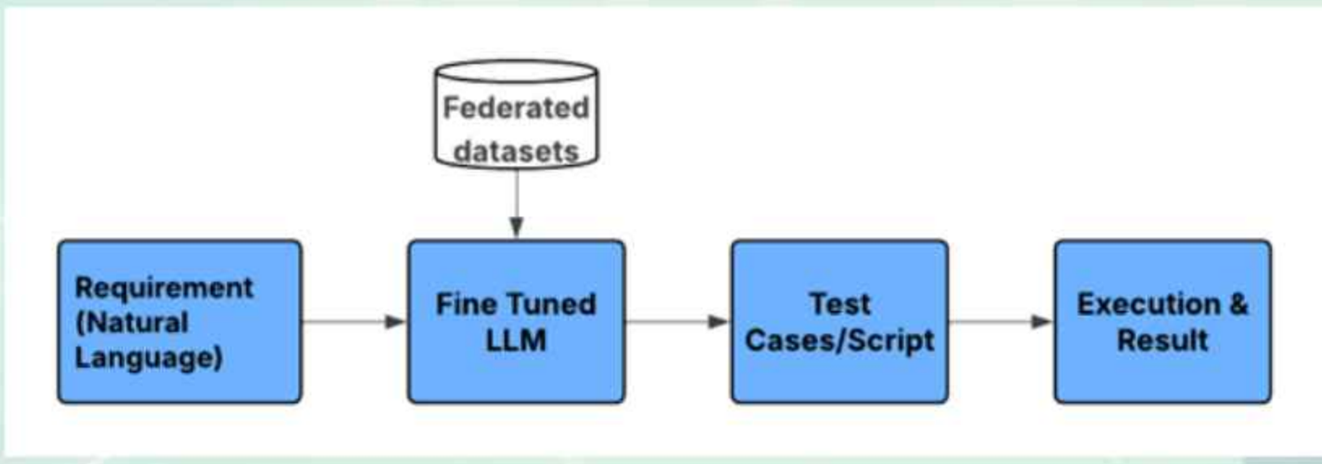
Recent advancements in this field have demonstrated that LLMs can go far beyond simple code generation. Current research and industry practices show their growing use in automated test case generation, requirement-to-test translation, and intelligent debugging assistance. Models such as CodeLlama, GPT-4, and PaLM are increasingly being explored for generating structured test scripts and improving software validation workflows..

These models are now being integrated into development environments, enabling systems that can automatically generate, refine, and even self-correct test scripts. This shift reflects a broader movement toward AI-assisted software engineering, where testing is no longer a separate phase but an integrated, continuously evolving process.

Fine-Tuning LLMs for Test Generation-

Building on these advancements, my research in this domain focuses on leveraging Large Language Models for acceptance test script generation in mobile-based applications, with a specific emphasis on fine-tuning a base model such as CodeLlama using supervised fine-tuning (SFT) on a domain-specific dataset.

By training the model on structured testing data and real application scenarios, it becomes better aligned with practical requirements and produces more context-aware outputs. Through experimental evaluation, it was observed that this fine-tuned approach significantly improves efficiency by reducing test design time while enhancing the accuracy, consistency, and relevance of generated test cases.



Finetune the base Model on Own dataset for a federated model

Real-World Application-

To understand this in a real-world context, consider a cloud-based banking application. Testing features such as login and transaction workflows traditionally

requires creating multiple test cases for valid inputs, invalid credentials, and edge conditions. This process is repetitive and time-consuming. With LLMs, a simple instruction like “test the login functionality” can automatically generate a complete set of test scenarios, covering both normal and unusual cases, reducing effort while maintaining reliability.

This clearly shows how LLMs bridge the gap between human understanding and actual testing processes. In real-world environments, such automation can reduce testing time from hours to minutes, making it highly valuable for fast-paced development cycles. Even non-technical stakeholders can contribute by describing expected behaviour in natural language, making the testing process more inclusive and aligned with real user expectations.

Bridging Human Intent and Test Execution-

When compared to existing testing methodologies, the improvement is substantial. Conventional automated testing frameworks, while effective, still depend heavily on manual scripting and periodic updates. They are structured but often rigid. LLM-driven testing introduces flexibility, enabling systems to adapt quickly to changes and generate meaningful test scenarios with minimal human intervention.

Where Can This Be Applied?-

The applicability of LLM-based testing spans multiple domains.

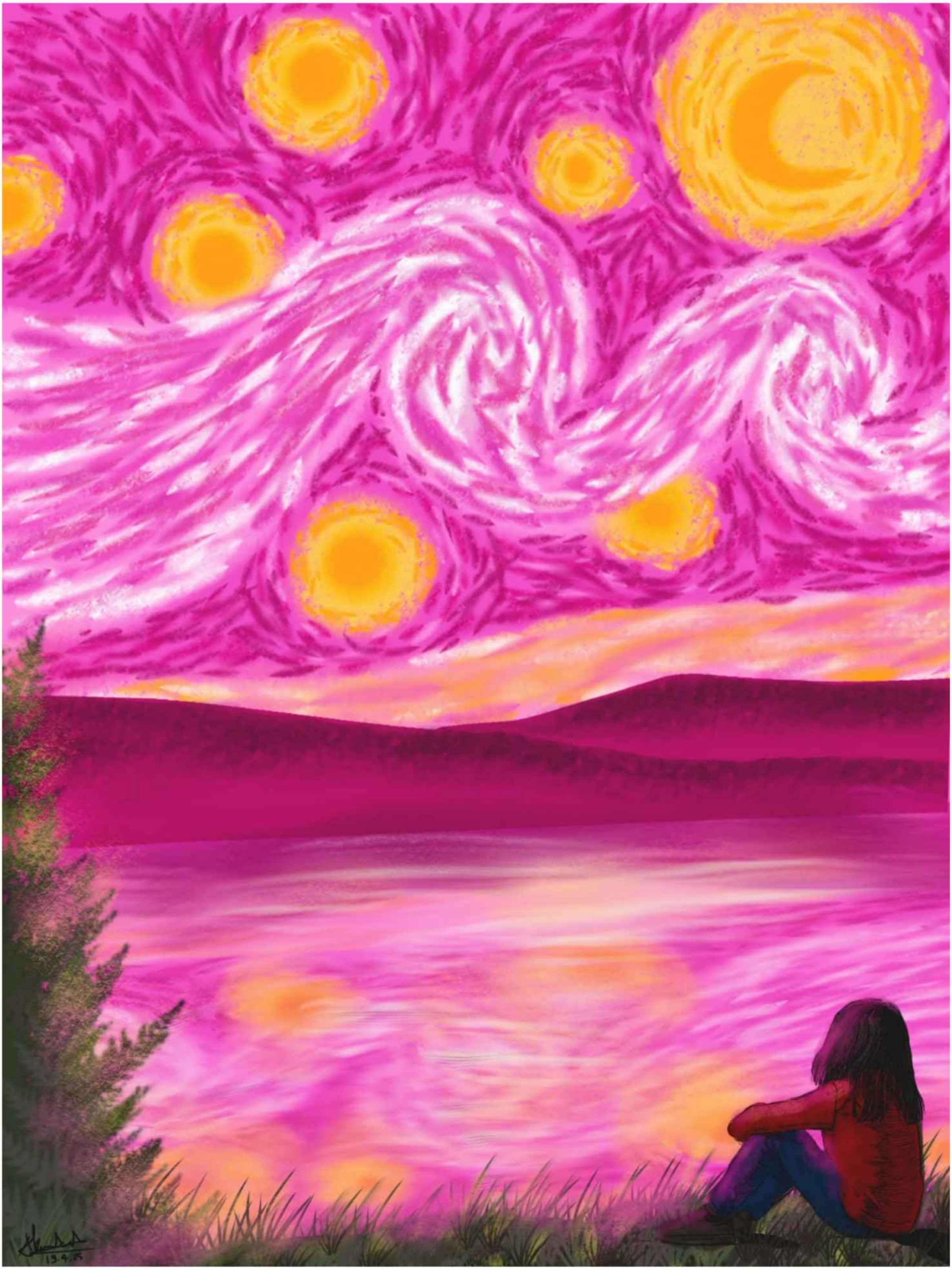
In web and mobile application development, it facilitates rapid validation of user interactions and workflows. In enterprise systems, it supports the testing of complex business logic with reduced manual effort. In cloud-native environments, where scalability and dynamic behaviour are critical, LLMs help maintain consistent quality across distributed systems. Additionally, in DevOps and continuous integration pipelines, LLMs can automate test generation and updates, enabling faster and more reliable software delivery.

In conclusion, Large Language Models are not merely enhancing software testingg—they are transforming it into a more adaptive, efficient, and intelligent discipline. By bridging the gap between requirements and execution, they reduce effort, improve coverage, and accelerate development timelines. As this technology continues to mature, it is poised to become a foundational component of modern software quality engineering.

References-

[1]**Software Testing in LLMs: The Shift Towards Autonomous Testing** by Kathiresan Jayabalan (DZone, March 2026).

[2]**AutoQALLMs: Automating Web Application Testing Using Large Language Models (LLMs) and Selenium** (MDPI Electronics, November 2025)



SWIRLING SILENCE-A Digital Art

Simi Choubey(4th Year)

From SLAM to Neural and GS-SLAM: Algorithms Behind Spatial Computing & Robotics Evolution

Sajal Kumar Ghosh (CSE, 1st Yr)

Introduction

Spatial computing embeds computation into three-dimensional physical space so digital content can align with and react to the real world instead of staying on flat screens. It underpins AR, VR, MR, sensor fusion, and digital twins, all of which require accurate geometry, motion, and semantic understanding of the environment.

At the core lies Simultaneous Localization and Mapping (SLAM), which builds a map of an unknown environment while estimating an agent's pose from noisy sensors and controls. SLAM has evolved from probabilistic, geometry-centric pipelines (EKF-SLAM, graph-based SLAM, ORB-SLAM) to neural SLAM and dense visual SLAM with 3D Gaussian splatting (GS-SLAM), enabling real-time 3D reconstruction and task-aware mapping for robotics and XR.

Spatial Computing Basics

Spatial computing systems capture, process, and interact with 3D data about the physical world instead of only using 2D GUIs. They track user pose, orientation, and body motion so virtual content appears co-located with physical objects

Devices such as head-mounted displays, smartphones, robots, and instrumented environments combine RGB cameras, depth sensors, and IMUs to estimate pose and reconstruct 3D structure in real time. These capabilities support immersive AR, mixed-reality collaboration, spatial audio, and context-aware automation (digital twins, warehouse robotics, self-driving vehicles), all dependent on persistent maps.

Classical SLAM Foundations

SLAM can be seen as probabilistic inference: given control inputs u1:t and observations o1:t, estimate the posterior P(mt,xt | o1:t,u1:t) over robot state xt and map mt. The system alternates prediction using motion models and correction using sensor measurements, typically via Bayesian filtering or batch optimization, while handling data from lidar, cameras, RGB-D, odometry, and IMUs under limited compute.

Filter-based SLAM (EKF, Particle Filters)

EKF-SLAM maintains a joint Gaussian over robot pose and landmark positions and updates its state and covariance as new measurements arrive. It is simple but scales as O(n2) in the number of landmarks and suffers from linearization errors when uncertainty is large, so it does not scale well to big environments.Particle-filter methods like FastSLAM represent the posterior with weighted pose particles and conditionally independent landmark estimates, handling strong non-linearities and multi-modality better, but at the cost of higher sampling complexity.

Graph-based SLAM and ORB-SLAM

GraphSLAM formulates SLAM as a sparse non-linear least-squares problem on a factor graph whose nodes are poses/landmarks and edges are motion or measurement constraints. By exploiting sparsity and using iterative solvers (Gauss-Newton, Levenberg-Marquardt), it scales better than dense EKF-SLAM and naturally incorporates loop-closure constraints.

Modern visual systems like ORB-SLAM use a keyframe-based graph where selected frames are nodes and feature correspondences define reprojection errors optimized with bundle adjustment. ORB-SLAM separates tracking, local mapping, and loop closure, and uses ORB features plus a bag-of-words representation to achieve real-time performance on standard hardware.

Visual and RGB-D SLAM

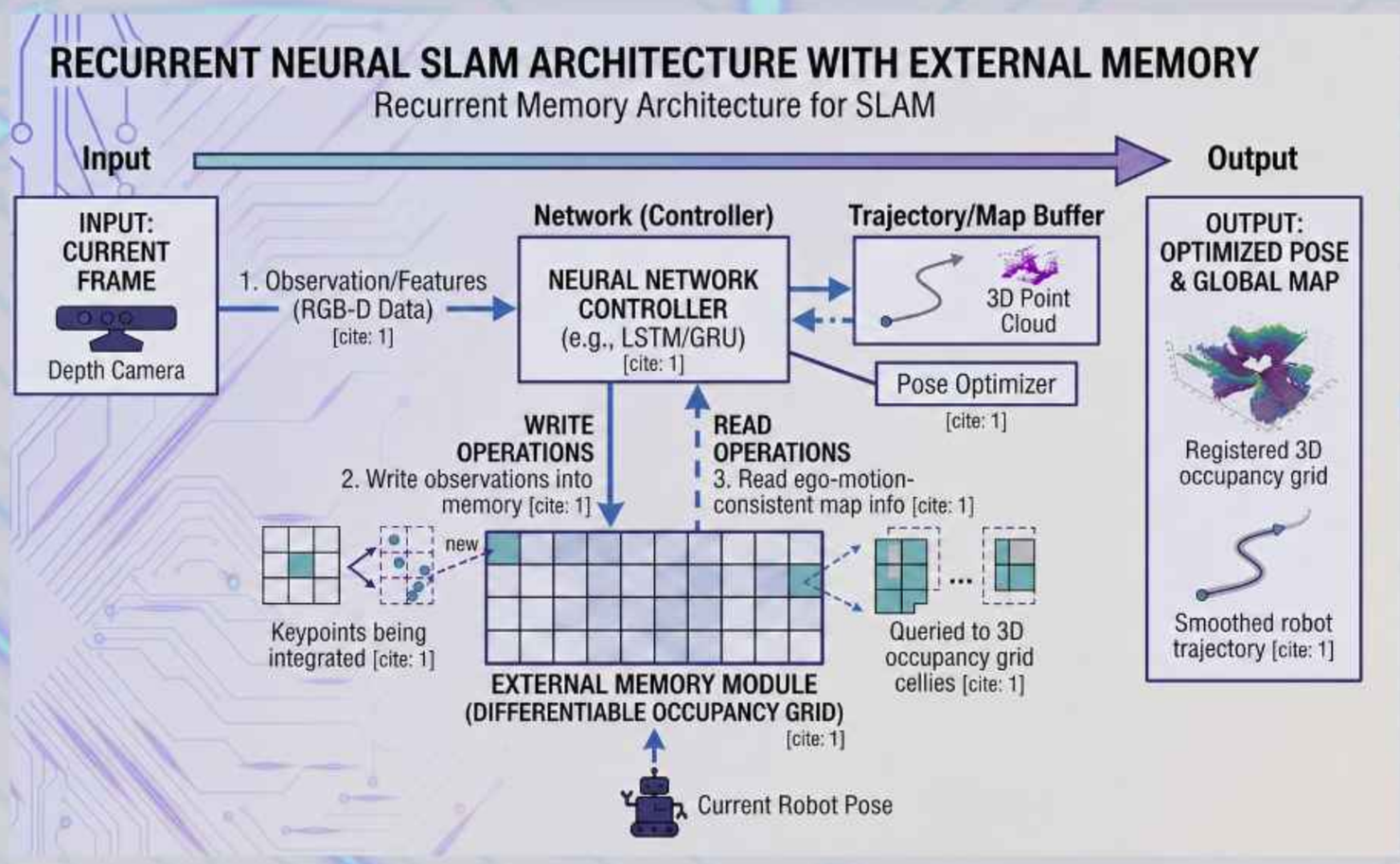
Visual SLAM (V-SLAM) uses camera images, often fused with depth (RGB-D SLAM) or inertial data (VIO), aligning naturally with AR/VR and mobile sensors. Typical pipelines include feature detection/description, matching or optical flow, pose estimation via PnP or epipolar geometry, then local/global optimization.
Feature-based methods rely on ORB, SIFT, or SURF plus RANSAC to reject outliers under viewpoint and illumination changes, while direct methods optimize photometric consistency on intensities, which helps in low-texture areas but is more sensitive to photometric modelling . RGB-D SLAM uses per-pixel depth to resolve scale and build dense 3D reconstructions critical for collision handling, occlusion, and digital-twin pipelines.

Neural SLAM with External Memory

In "Neural SLAM: Learning to Explore with External Memory," an RL agent uses a differentiable occupancy-grid-like external memory for mapping and exploration. The network learns to write observations into spatial memory, perform ego-motion-consistent reads, and use the global map for planning, effectively learning a task-specific SLAM mechanism end-to-end.
Gradients pass through memory operations encoding localization and map updates, unlike traditional pipelines where SLAM and decision-making are separate modules.

Neural SLAM

Neural SLAM embeds SLAM-like operations in differentiable architectures or augments classical SLAM with learned components to improve robustness and integrate perception, mapping, and planning.



Deep-Feature SLAM (DF-SLAM and Hybrids)

DF-SLAM replaces hand-crafted local descriptors with CNN-based descriptors while keeping an ORB-SLAM-style pipeline. This improves robustness and stability in challenging scenes (e.g., illumination changes) and maintains real-time operation on GPUs. More broadly, deep networks now learn key point descriptors, global image embeddings for place recognition, loop-closure detectors, monocular depth, and semantic segmentation, which feed into classical back-ends. This hybrid strategy leverages mature SLAM optimization while replacing brittle heuristics with data-driven modules.

Differentiable Mapping and Challenges

Neural SLAM often uses structured external memories (2D/3D feature grids) as latent maps with differentiable read/write operations controlled by attention, motion integration, and observation encoders.

This makes mapping trainable via gradient-based or RL methods and lets agents learn where to allocate representational capacity and which features matter for tasks.
However, scaling differentiable memories to large continuous spaces is difficult, training is data-hungry, and robustness and generalization under domain shift are open issues for safety-critical robotics and spatial computing.

GS-SLAM and 3D Gaussian Splatting

GS-SLAM is a dense visual SLAM system that represents the scene as 3D Gaussian primitives with position, covariance, color, and opacity, rendered by a fast differentiable splatting pipeline. Compared to neural implicit representations like NeRFs, 3D Gaussian splatting offers much higher rendering speed while preserving detailed geometry and appearance, making it suitable for online SLAM with low latency.
GS-SLAM is reported as the first dense RGB-D SLAM system to fully exploit 3D Gaussian representations, reaching a strong efficiency-accuracy trade-off versus real-time baselines.

System Architecture

On datasets like Replica and TUM-RGBD, GS-SLAM reaches competitive or superior reconstruction accuracy relative to other dense neural RGB-D SLAM methods while running in real time or even hundreds of frames per second for rendering on modern GPUs. Such performance is crucial for XR and robotics where latency and stability affect usability and safety. The dense, photorealistic reconstructions produced by GS-SLAM are valuable for digital twins, immersive telepresence, teleoperation, and AR applications that demand precise occlusion, realistic lighting, and stable spatial anchoring of virtual assets.

Performance and Spatial Computing Relevance

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Future Directions

Semantic and Task-Aware Maps

Semantic SLAM augments geometry with labels, instances, and affordances, turning maps into 3D scene graphs understandable by humans and machines. This enables context-aware AR (e.g., anchoring to tables not arbitrary planes), safety-aware robots, and task-oriented workflows in factories or warehouses.Neural SLAM with external memories and learned perception, combined with large vision–language models, could support spatial systems that follow natural-language instructions grounded in 3D, such as “highlight all emergency exits and shortest paths.”

Generative Models and World Simulation

Generative models like NeRFs, Gaussian-splatting renderers, and diffusion-based 3D reconstruction already enable rapid creation of photorealistic digital twins from sparse data. Future SLAM may integrate these models to hallucinate plausible completions of unobserved areas, provide uncertainty-aware predictions, and support counterfactual simulations for planning.
In spatial computing, such generative SLAM could stylize or transform environments while preserving physical layout, or let robots simulate multiple strategies in learned world models before acting. GS-SLAM's use of 3D Gaussians hints at this by showing differentiable high-fidelity 3D representations can run interactively.

Collaborative SLAM and City-Scale Twins

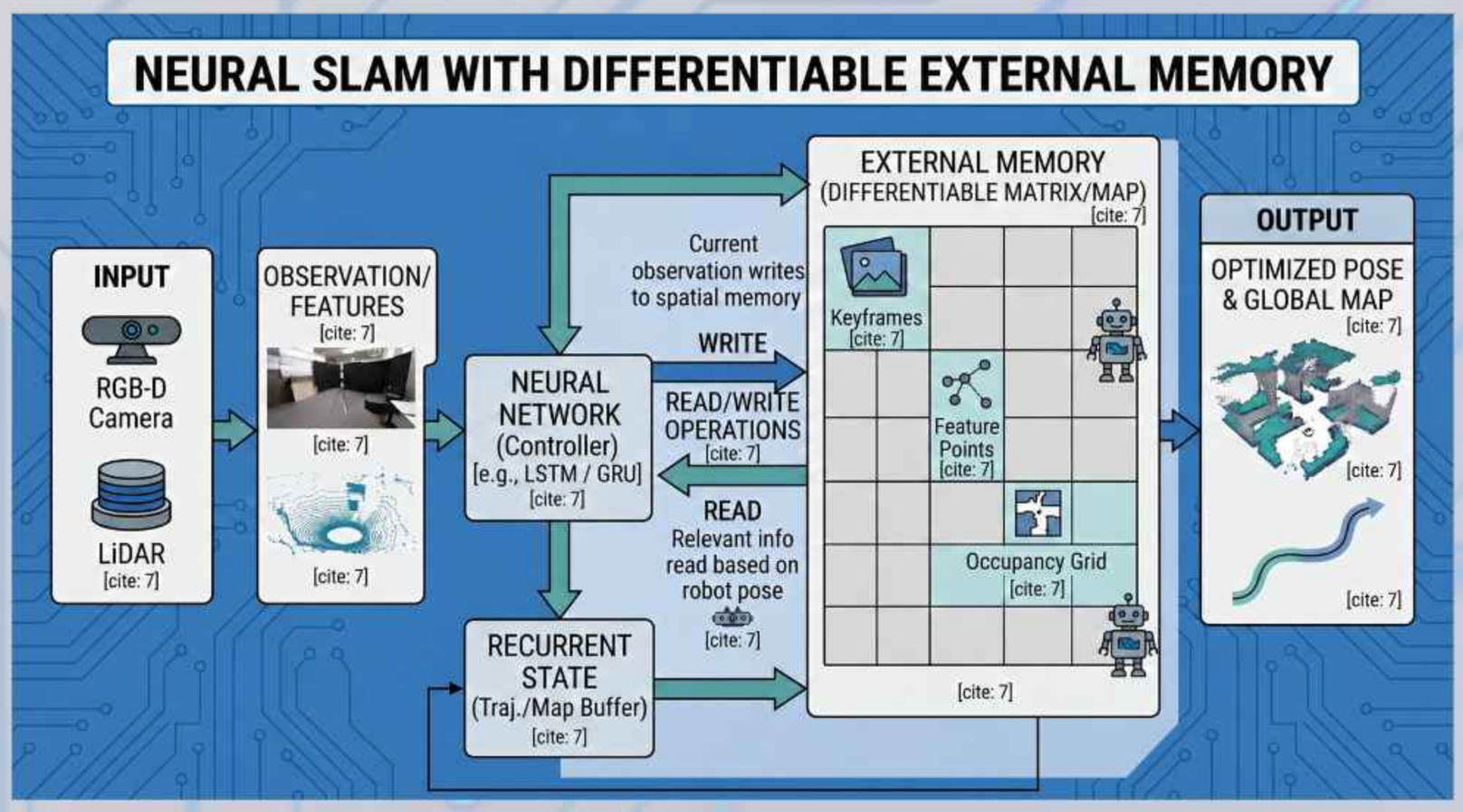
Large-scale collaborative SLAM across many devices or robots could build campus- or city-scale digital twins.
Edge devices would handle local mapping, while cloud services merge partial maps into globally consistent, richly annotated models for multi-user AR, fleet coordination, and infrastructure monitoring.
Scalability and privacy motivate compressed map representations (Gaussian or neural encodings), federated learning, and privacy-preserving SLAM that contribute to global models without exposing sensitive raw sensor data.

Hardware Co-Design and New Sensors

Spatial computing platforms increasingly rely on specialized accelerators (mobile GPUs, NPUs, vision processors, potential dedicated units for ray tracing or Gaussian splatting), encouraging co-design of SLAM and GS-SLAM algorithms with hardware under strict power and latency limits. Future systems may also integrate event cameras, radar, and UWB for robust localization in difficult conditions, fused with deep learning for cross-modal SLAM.

Conclusion

Spatial computing shifts computing into deeply embedded 3D, and SLAM is the fundamental capability for constructing and maintaining consistent spatial representations. Classical SLAM methods are mature and widely deployed, neural SLAM brings learned perception and differentiable memory, and GS-SLAM shows that 3D Gaussian splatting can deliver dense, high-quality maps and real-time rendering for XR and robotics.



The fusion of semantic understanding, generative models, collaborative mapping, and hardware co-design points toward SLAM systems that not only localize and map but also reason, predict, and communicate within future spatial computing ecosystems.

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THE RECIPE OF LIFE

ARSHI
CSE, 3RD YR

**Life is not a single taste—
it is a full meal.**

**A little salt on the tongue,
a sudden sweetness,
a bitterness that lingers longer than expected,
and spice—
that burns just enough
to make you feel alive.**

**The one who understands life best
is not the one who chooses sweetness,
but the one
who has tasted everything
and still sits at the table.**

**Strange, isn't it?
Even the sweetest dish
needs a pinch of salt
to become itself.**

**And bitterness—
so often avoided—
quietly protects you
from drowning in too much sweetness.
Sometimes,
you even crave it.**

**Imagine a life
where only your favourite is served—
every day,
every meal.**

At first, it feels like a celebration.
Then slowly,
it becomes repetition.
And eventually—
it becomes something you can no longer stand.

We need variety
to enjoy taste.
Yet we expect life
to be a straight line of happiness.

But happiness,
like sweetness,
cannot exist alone.

It needs contrast—
a touch of sorrow,
a moment of uncertainty,
a shift in flavour—
to be felt fully.

Each taste has a purpose:
bitterness to balance,
salt to enhance,
spice to awaken,
sweetness to soften.

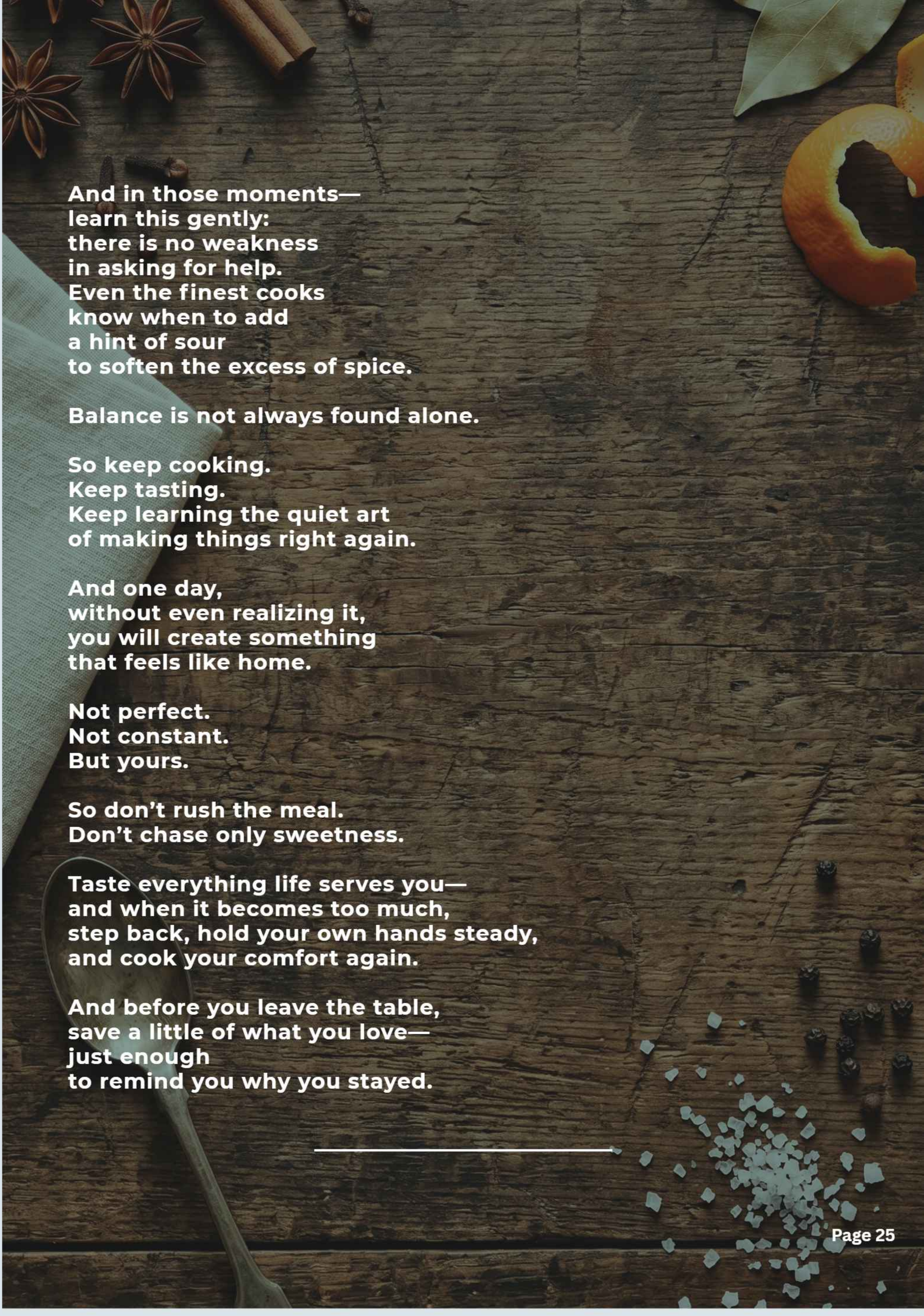
Nothing is wasted.

So sit at the table of your life.
Taste everything—
even what you do not like.

Because somewhere between
what you accept
and what you resist,
you begin to discover your own flavour.

And that—
no one else can cook for you.

You will make mistakes.
You will burn things.
Sometimes,
you won’t know how to fix what you’ve made.



And in those moments—
learn this gently:
there is no weakness
in asking for help.
Even the finest cooks
know when to add
a hint of sour
to soften the excess of spice.

Balance is not always found alone.

So keep cooking.
Keep tasting.
Keep learning the quiet art
of making things right again.

And one day,
without even realizing it,
you will create something
that feels like home.

Not perfect.
Not constant.
But yours.

So don’t rush the meal.
Don’t chase only sweetness.

Taste everything life serves you—
and when it becomes too much,
step back, hold your own hands steady,
and cook your comfort again.

And before you leave the table,
save a little of what you love—
just enough
to remind you why you stayed.

STEP INTO TECHNOLOGY POWERED FUN FACTS

KRISHNENDU SANKAR MANDAL
CSE, 3RD YR

THE FIRST "BUG" WAS REAL: IN 1947, GRACE HOPPER FOUND A LITERAL MOTH STUCK IN A RELAY OF THE HARVARD MARK II COMPUTER, IMPEDING ITS OPERATION. SHE TAPED IT INTO THE LOGBOOK AND LABELED IT THE "FIRST ACTUAL CASE OF BUG BEING FOUND."

CAPTCHAS ARE FREE LABOR: EVERY TIME YOU CLICK "I AM NOT A ROBOT" OR IDENTIFY TRAFFIC LIGHTS, YOU ARE ACTUALLY HELPING TRAIN AI MODELS FOR AUTONOMOUS DRIVING AND OCR (OPTICAL CHARACTER RECOGNITION).

·THE QWERTY KEYBOARD LAYOUT WAS ACTUALLY DESIGNED TO SLOW YOU DOWN. ON EARLY TYPEWRITERS, IF YOU TYPED TOO FAST, THE MECHANICAL ARMS WOULD JAM. THE LAYOUT WAS ENGINEERED TO SEPARATE COMMON LETTER PAIRS (LIKE 'S' AND 'T') TO PREVENT THOSE JAMS. EVEN THOUGH WE DON'T HAVE MECHANICAL ARMS ANYMORE, THE HABIT STUCK!

FIREFOX IS NOT A FOX: DESPITE THE LOGO, A "FIREFOX" IS ACTUALLY ANOTHER NAME FOR A RED PANDA, AN ANIMAL NATIVE TO THE HIMALAYAS.

·THE FIRST DOMAIN NAME·THE VERY FIRST .COM DOMAIN EVER REGISTERED WAS SYMBOLICS.COM ON MARCH 15, 1885. IT'S STILL ONLINE TODAY AS A SMALL MUSEUM FOR INTERNET HISTORY.

WHEN CAMERAS LEARN TO SEE TROUBLE

A SMARTER WAY TO SPOT VIOLENCE ON CCTV

SURYANSHU PAUL & TEAM

Walk through any busy railway station, school corridor, or city square today, and you are almost certainly on camera. CCTV has quietly become the background wallpaper of modern life. But here is the uncomfortable truth behind all those blinking lenses: most footage is never actually watched. A single human operator staring at a wall of monitors simply cannot stay alert across dozens of feeds for hours on end. Fatigue sets in, attention drifts, and by the time someone notices a fight breaking out, the moment to intervene has already passed. A recent research paper from the Department of Computer Science & Engineering at B. P. Poddar Institute of Management & Technology, Kolkata, takes a fresh swing at this problem. Authored by Suryanshu Paul, Dipon De, Argha Mallick, Ajay Raj and Pratap Chandra Mandal [1], the work proposes a deep learning system that watches video on behalf of humans and raises an alarm the moment it spots violence — and crucially, it does so without needing a data-center-sized computer behind it.

THE CORE IDEA: TURN A VIDEO INTO A SINGLE PICTURE

Most violence detection research has leaned on heavyweight tools: 3D convolutional networks, two-stream optical flow models, or recurrent networks like LSTM. These architectures are powerful, but they are also hungry. They demand serious GPU muscle, consume a lot of memory, and are slow to react — all fatal flaws for a camera mounted on a school wall or a street pole. The Kolkata team's insight is almost elegantly simple. Instead of asking a neural network to chew through an entire video, they compress the video into one single representative image before classification even begins [1]. From any video clip, the system picks 17 frames spread evenly across the clip's duration, then averages those 17 frames together, pixel by pixel. The resulting image looks a bit like a long-exposure photograph — sharp where nothing moved, blurred where people moved violently. That motion blur is not a defect. It is the signal. A peaceful scene of people walking produces gentle, predictable blur, while a street brawl produces chaotic, overlapping smears of movement. In other words, the averaged image silently encodes what kind of motion happened in the clip, without the network ever having to process timeordered sequences. This sidesteps one of the biggest bottlenecks in video AI: the need to reason across time explicitly.

A LIGHTWEIGHT BRAIN FOR AN EVERYDAY CAMERA

Once the video is reduced to a single image, the heavy lifting becomes a classic image classification problem — the kind deep learning already handles beautifully. The team chose MobileNetV2, a network specifically engineered to run on phones and low-power hardware, as their feature extractor. On top of it they stacked a custom classification head: a series of dense layers with dropout and batch normalisation, ending in a single neuron that answers the only question that matters: Is this violence, yes or no? Training was done in two phases, a strategy designed to protect the knowledge MobileNetV2 had already absorbed from ImageNet. In the f irst phase, the backbone was frozen and only the new classification head was taught. In the second, the top layers of the backbone were unfrozen and gently fine-tuned with a much smaller learning rate [1]. The approach prevents what researchers call “catastrophic forgetting” — the risk that a pretrained model will lose its useful general knowledge when pushed too hard on a narrow new task.

HOW WELL DOES IT WORK?

The team tested their system on the Real-Life Violence Situations dataset, which contains 2,000 clips split evenly between violent and non-violent scenes. The footage is deliberately varied: indoor and outdoor, daylight and dusk, low resolution and high, crowded and empty. The numbers are striking. The system hits 91% overall accuracy, and more importantly, a 94% recall on violence — meaning it catches 94 out of every 100 violent incidents [1]. For a safety-critical application, recall matters more than raw accuracy, because the cost of missing a real fight is far higher than the cost of a false alarm about a sports tackle. And it achieves this with numbers that will make engineers smile: just 22.9 million parameters and around 50 milliseconds of inference time per clip. The authors note their model is three to nine times smaller than many competing architectures and runs about 130 times fewer floatingpoint operations than a comparable 3D CNN [1]. In practical terms, they got it running on an Intel i3 (6th generation) machine with only 4 GB of RAM —an everyday office computer, no dedicated GPU required.

WHERE IT STILL STUMBLES

The researchers are refreshingly honest about the model’s blind spots. Crowded scenes with lots of movement can fool it into calling sports or theatrical performances “violent.” Very brief altercations — shorter than about two seconds — sometimes slip by unnoticed, because the frameaveraging trick needs enough motion to leave a distinctive blur pattern. Low-light footage also degrades performance, as does subtle aggression without overt physical contact. Their proposed fixes for the next iteration are sensible: adaptive frame sampling that zooms in on suspicious short bursts, audio cues to catch shouting or impact sounds, and testing on additional benchmark datasets such as RWF-2000 and Hockey-Fight to prove the system generalises beyond one dataset [1].

WHY THIS MATTERS

There is a quiet but important shift happening in computer vision research. For years, the field was dominated by a “bigger is better” philosophy —larger models, more data, heavier compute. Papers like this one push in the opposite direction, asking what is the smallest, simplest tool that can still do the job well. For a country like India, where CCTV infrastructure is expanding rapidly but budgets for industrial-grade AI servers are not, that question is more than academic. A violence detection system that can run on the kind of hardware already sitting in a school security office, or inside a modest retail surveillance rig, is the difference between a research paper and a product that actually reaches the street. The Poddar Institute team have not solved the problem of public safety, and they would be the f irst to say so. But they have made a credible case that you do not need a supercomputer to teach a camera to recognise trouble. Sometimes, a clever trick and a lightweight model are enough.

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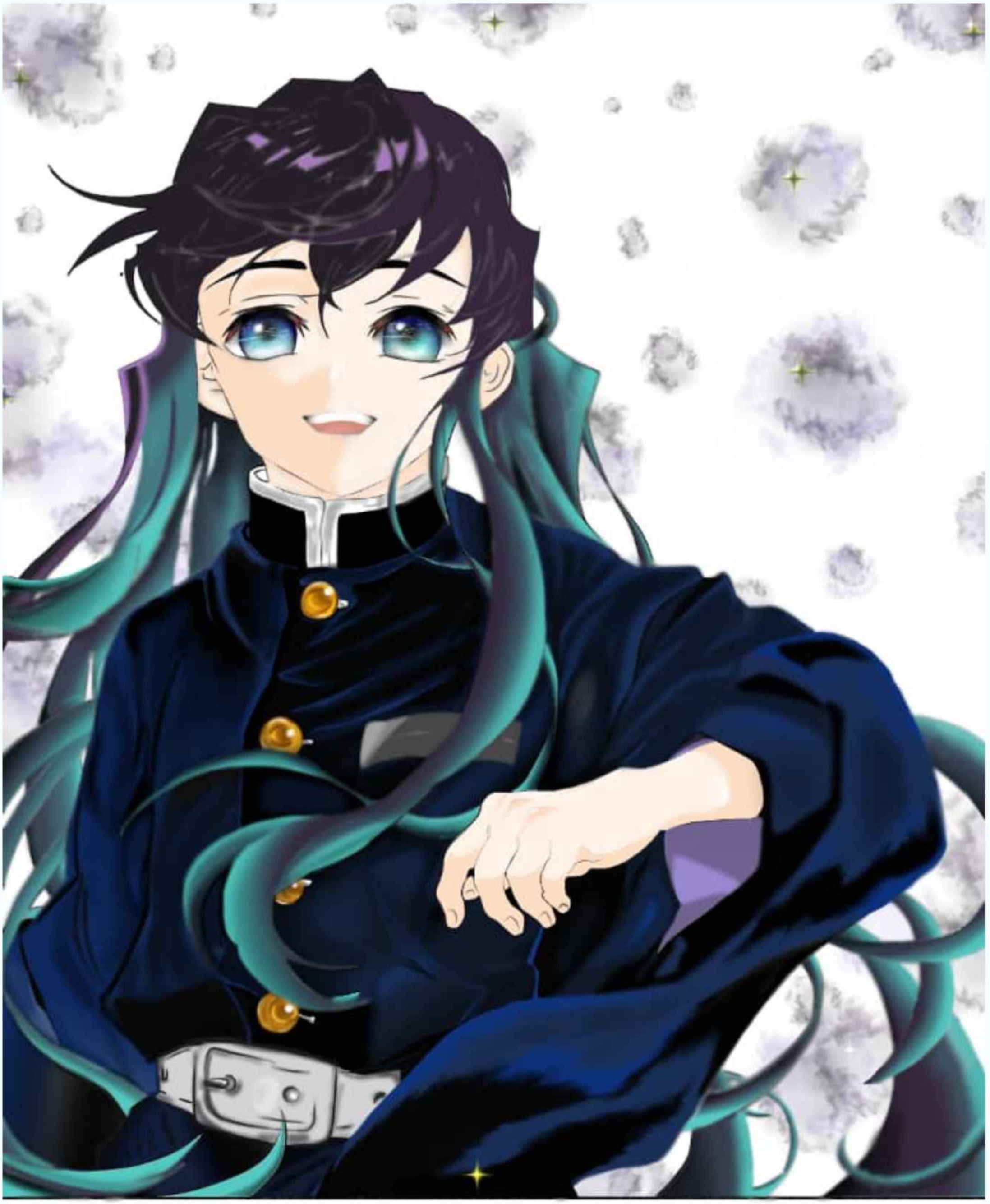
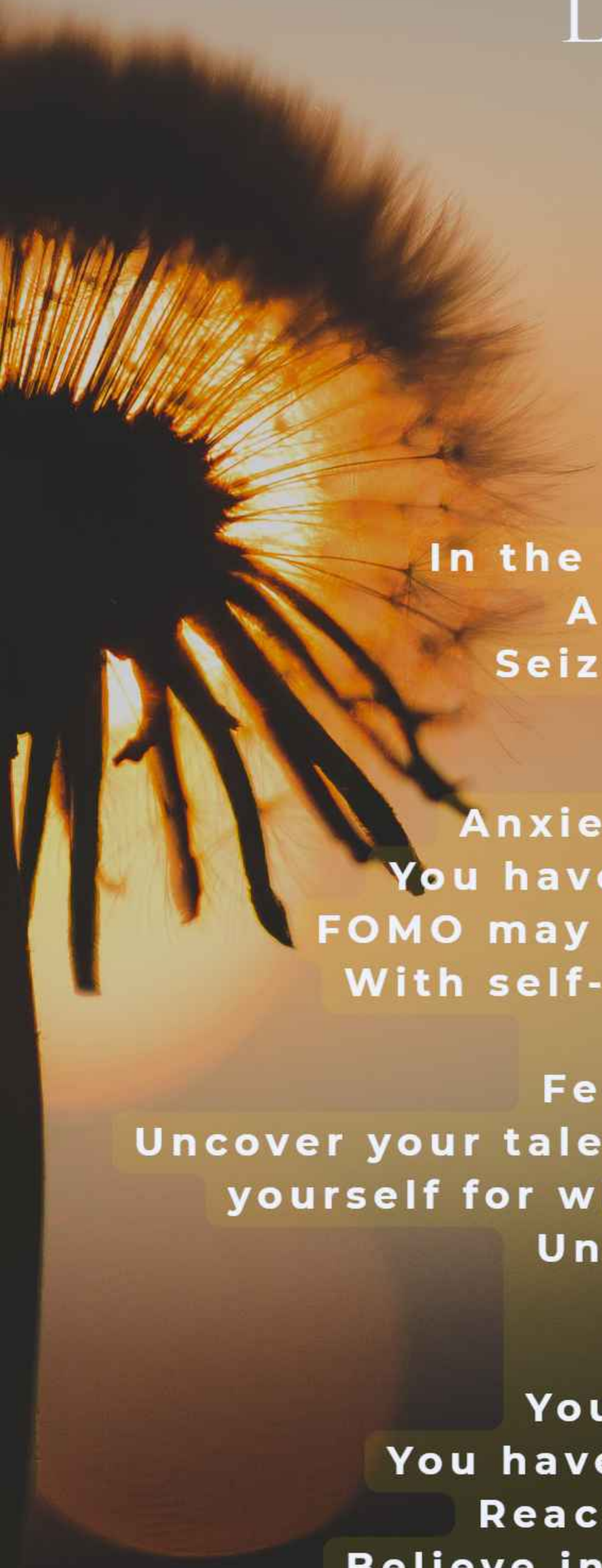


Muichiro Tokito
from
Demon Slayer: Kimetsu no Yaiba

Harsh Jaiswal
CSE, 1st yr

DARKNESS: THE HIDDEN LIGHT

SRIJEETA DUTTA
CSE, 1ST YR



In the depths of darkness where doubts lay,
A spark of light flickers within to stay.
Seize the opportunity to shine with light,
Unfold your dreams, seize the fight.

Anxiety may be a dance, but do not forget,
You have the power to face the dark of night.
FOMO may whisper, but your purpose will shine,
With self-confidence, your brilliance will shine.

Feeling like an imposter, a haze of fear,
Uncover your talents, let them surprise and cheer. Love yourself for who you are, shine with all your might,
Unfold your path, conquer every height.

Young adult, let this be a truth to know,
You have a power within you waiting to grow.
Reach for the sky, soar above your height,
Believe in yourself, let your doubts take flight.

In the dark of night, you will find your way,
You have a light within you to shine each new day.
Love yourself, let your fear be unfurled,
Reach for your goals, remake the world.

BACK TO SCHOOL RIDDLES

- I have keys, but no locks. I have a space, but no room. You can enter, but never leave.
  What am I?

  Abhinav Bal,
  CSE, 2nd yr

- একটি ঘরে অন্ধকার। আপনার কাছে একটি দেশলাই কাঠি আছে। ঘরে একটি মোমবাতি, একটি কেরোসিন ল্যাম্প এবং একটি উনুন আছে। আপনি আগে কোনটি জ্বালাবেন?

  Sajal Kumar Ghosh,
  CSE, 1st yr

- I have cities, but no houses. I have mountains, but no trees. I have water, but no fish.

- "ना आँखें हैं, ना है मुँह,
  फिर भी बोलूँ हर एक सूँ,
  दुनिया भर की बातें जानूँ,
  बिना पंख के दूर तक जाऊँ।"

  Shreya Dhar
  CSE, 2nd yr

- I am an algorithm that loves to organize. I pick a "pivot" from the crowd and tell everyone: "If you are smaller than the pivot, move to the left; if you are larger, move to the right." I keep doing this recursively until everyone is perfectly in line.

  Abhinav Bal,
  CSE, 2nd yr

For Answers: Refer to page 57

THE GHOST IN THE MACHINE: CAN CODE EVER TRULY BE CREATIVE?

Payel Pal
CSE, 1st yr

Abstract

The rapid evolution of Artificial Intelligence (AI), particularly Large Language Models (LLMs) and generative systems, has reignited a long-standing philosophical and computational debate: can machines truly be creative? This article examines the technical foundations of modern AI systems—probabilistic modeling, latent representations, entropy control, emergent behavior, and adversarial learning—to analyze whether machine-generated outputs constitute genuine creativity or sophisticated statistical mimicry. By bridging computer science, information theory, and cognitive parallels, the discussion challenges the boundary between algorithmic computation and human imagination.

Introduction

For decades, the distinction between human creativity and machine computation remained clear. Humans conceptualized; machines executed. However, the emergence of generative AI systems has blurred this boundary. Today, AI can produce poetry, art, music, and code that rival human outputs, raising a fundamental question:
Is AI creating—or merely calculating?
This inquiry is not purely philosophical; it is rooted in the architecture and mathematical principles that govern modern machine learning systems.

The Stochastic Parrot: Probability over Semantics

At their core, most generative AI models operate through statistical inference, specifically next-token prediction. Given a sequence of inputs, the model computes a probability distribution over possible subsequent tokens using functions such as Softmax.
Formally:

- **The model does not "understand" meaning.**
- **It selects outputs based on maximum likelihood estimation.**

This has led to the term "Stochastic Parrot", suggesting that AI systems:

- **Mimic linguistic and artistic patterns**
- **Lack true semantic grounding or intentionality**

Thus, AI exhibits the form of creativity (syntax) without necessarily possessing its essence (semantic understanding).

Latent Space: The Geometry of Imagination

During training, neural networks encode information into a latent space —a high-dimensional vector space where concepts are represented numerically.
Key properties:

- **Each idea corresponds to a vector**
- **Relationships are encoded as distances and directions**
- **New outputs are generated via vector interpolation**

For example:
Combining vectors representing "classical architecture" and "futuristic materials" can yield novel hybrid designs.

This process mirrors human cognition:

- Humans recombine experiences
- AI recombines encoded representations

The implication is profound:
Creativity may not require originality from nothing—but recombination within a structured space.

Entropy and the Temperature Parameter

In information theory, entropy measures uncertainty or randomness.
In AI systems, this concept is operationalized through the temperature parameter during sampling.

- Low Temperature (T → 0):Deterministic outputs
- High probability tokens
- Safe, predictable responses
- High Temperature (T > 1):Increased randomness
- Exploration of low-probability tokens
- Potential for both creativity and hallucination

This suggests that:
Creativity in AI can be modeled as controlled randomness within probabilistic constraints.
Thus, what humans perceive as "creative brilliance" may emerge from deviations away from statistical averages.

Emergent Behavior and the Black Box Problem

As models scale in size (millions → billions → trillions of parameters), they exhibit emergent behaviors—capabilities not explicitly programmed during training.
Examples include:

- Zero-shot learning
- Contextual reasoning
- Linguistic nuance and sarcasm

However, this leads to the Explainable AI (XAI) challenge:

- Internal representations are distributed across layers
- Interpretability becomes increasingly difficult

This opacity creates the illusion of a "ghost" within the system—an apparent intelligence that exceeds explicit human design.

Generative Adversarial Networks: Creativity through Conflict

Generative Adversarial Networks (GANs) introduce a dual-network architecture:

- Generator: Produces synthetic data
- Discriminator: Evaluates authenticity

Through iterative competition:

- The generator improves by "fooling" the discriminator
- Outputs approach indistinguishability from real data

This dynamic resembles human creativity:

- Imagination proposes ideas
- Critical reasoning refines them

Thus, GANs simulate a computational analogue of creative tension.

Human vs Machine Creativity: A Computational Parallel

Human and machine creativity, while seemingly distinct, reveal striking structural similarities when examined through a computational lens. The human brain generates ideas through networks of neurons shaped by experience, memory, and associative learning, whereas AI systems rely on weighted parameters trained on vast datasets. In both cases, creativity emerges not from spontaneous invention ex nihilo, but from the recombination and transformation of prior inputs—whether encoded as synaptic patterns or latent vectors.

Humans introduce variation through intuition, emotion, and cognitive randomness; machines achieve a parallel effect through probabilistic sampling mechanisms such as temperature scaling. While human creativity is grounded in subjective consciousness and intentionality, and machine creativity lacks intrinsic awareness, the underlying processes in both systems suggest that creativity itself may be less about origin and more about the complexity of pattern manipulation within a learned representational space.

Conclusion

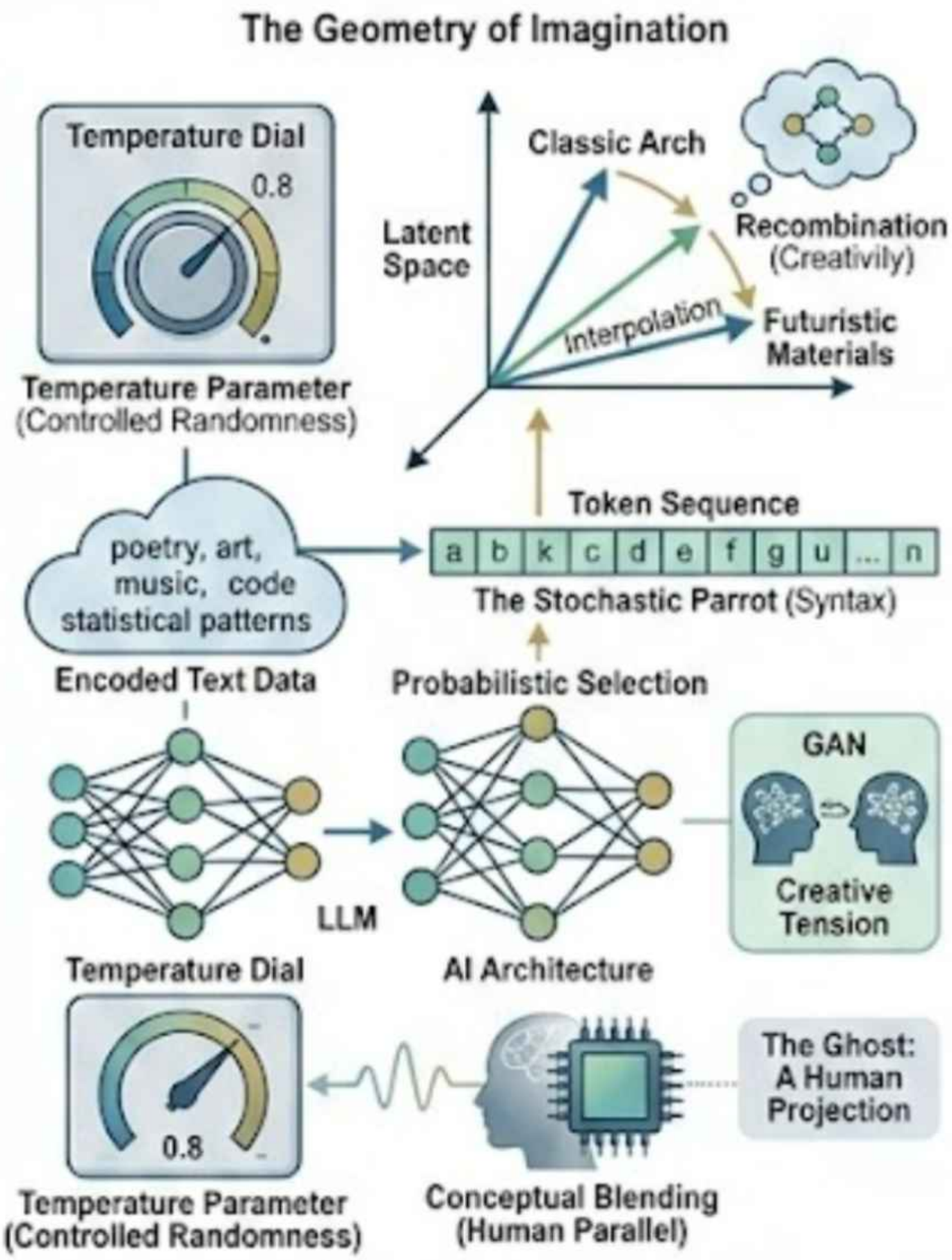
Modern AI systems represent a paradigm shift in computing:

- We are no longer programming explicit logic
- We are designing systems that learn representations

These systems act as mirrors of human cognition, reflecting:

- Our data
- Our biases
- Our creative structures

The "Ghost in the Machine" may not be an independent entity. Instead, it may be: A projection of human creativity, amplified through computational scale and probabilistic processes. As computer science students and researchers, we are not merely engineers—we are architects of a new epistemology, where creativity itself becomes programmable.



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অজানা আত্মীয়

শব্দভ্রমর

নমস্কার। আমি মালদার ছেলে,
তবে পড়াশোনার সুবাদে বর্তমানে
কলকাতার বাসিন্দা। আমার মতো
অনেককেই শিক্ষার টানে এই
মহানগরীতে ডেরা বাঁধতে হয়।

ফলে বাড়ি থেকে কলকাতা
আর কলকাতা থেকে বাড়ি–এই
যাতায়াতটাএখন জীবনের
অবিচ্ছেদ্য অংশ। আর এই
লম্বা পথের সিংহভাগই কাটে
ট্রেনের কামরায়। আজ এমনই
এক রেল-ভ্রমণের অভিজ্ঞতা
আপনাদের সঙ্গে ভাগ করে নেব,
যার সাথে হয়তো আপনারা
অনেকেই নিজের জীবনের কোনো
না কোনো মুহূর্তের মিল খুঁজে পাবেন।

ট্রেনে আমি সাধারণত একাই যাতায়াত
করি। জানালার পাশে বসে বাইরের
বদলে যাওয়া দৃশ্য দেখা
আরফেরিওয়ালাদের বিচিত্র হাঁকডাক
শুনতে শুনতে সময়টা মন্দ কাটে না।
মাঝেমধ্যে যদি কপালে ভালো কোনো
সহযাত্রী জোটে, তবে গল্পগুজব করতে
করতেপথ আরও ছোট হয়ে আসে।

দিনটা ছিল ১৫ই ফেব্রুয়ারি, ২০২৬;

শিবরাত্রির পুণ্যতিথি আর কাকতালীয়ভাবে দিনটি ছিল রবিবার। আগেভাগে টিকিট কেটে রেখেছিলাম, তাই নির্দিষ্ট সময়ে কলকাতা স্টেশনে পৌঁছে ট্রেনের অপেক্ষা করতে লাগলাম। ট্রেনের ঘোষণা হওয়ামাত্র নিজের বার্থে গিয়ে বসলাম। গিয়ে দেখি, আমার সহযাত্রীরা একই পরিবারের সদস্য—একজন মধ্যবয়স্কা কাকিমা, তাঁর শাশুড়ি মা (যিনি সম্পর্কে আমার দিদার বয়সী) এবং কাকিমার ছেলে।
কথা বলার ভঙ্গিতে এমন এক মায়া ছিল, যেন আমি তাঁর কতকালের চেনা!

কলকাতায় কোথায় থাকি, কী নিয়ে পড়াশোনা করছি— এমন হাজারো প্রশ্নে আড্ডা জমে উঠল। বয়স্ক মানুষের সঙ্গে এতটা সাবলীলভাবে কথা বলার অভিজ্ঞতা আমার আগে কখনও হয়নি। কাকিমাটিও ছিলেন তাঁর শাশুড়ির মতোই বেশ মনখোলা মানুষ। বিভিন্ন বিষয়ে তিনিও তাল মেলাচ্ছিলেন।

কিছুটা পথ এগোতেই তাঁরা বাড়ি থেকে আনা খাবারের প্যাকেট বের করলেন। সত্যি বলতে, ট্রেনে বাইরের খাবারদাবার খুব একটা আমি পছন্দ করি না। কিন্তু তাঁরা যখন আমায় খাওয়ার জন্য ডাকলেন, তখন সৌজন্যের খাতিরে আমি কয়েকবার বিনয়ের সঙ্গে মানা করলাম। তবে তাঁদের আন্তরিক জোরাজুরির কাছে শেষমেশ হার মানতে হলো। কাকিমা স্নেহের সুরে বলে উঠলেন, "বড়রা কিছু দিলে মানা করতে নেই।" এরপর আর আপত্তি করার সুযোগ কোথায়? আমার পাতে খাবার বেড়ে দিতে দিতে চলল আরও আদরমাখা শাসন—"আরও একটু নাও, জোয়ান ছেলে লজ্জা করলে চলে?"।

চলল ঘরোয়া আড্ডা। দিদা যেন গল্পের ঝাঁপি খুলে বসলেন। তাঁর ছেলেমেয়ে কে কী করেন, দাদু কী করতেন, এমনকি দাদুর চলে যাওয়ার গল্পও বাদ গেল না। আমিও মন্ত্রমুগ্ধের মতো শুনছিলাম আর মাঝে মাঝে নিজের কথা বলছিলাম। আড্ডার মাঝে বাঙালিয়ানা আর রাজনীতি আসবে না, তা কি হয়? রাজনীতির দলগুলোকে একচোট 'তুলোধোনা' করার পর আবার তাঁরা অন্য প্রসঙ্গে ফিরলেন। কাকিমা তো হেসেই অস্থির, দিদাকে বারবার বলছেন, "এবার থামো মা, ছেলেটার মাথা তো খেয়ে ফেললে একদম!"। আমি অবশ্য হেসে জানালাম, গল্পগুলো আমার বেশ ভালোই লাগছে।গল্পের রেশ কাটলে সবাই মিলে কিছুক্ষণ বিশ্রাম নিয়ে নিলাম।

ট্রেনের জানালা দিয়ে আসা ঠান্ডা হাওয়া আর বাইরের পরিচিত দৃশ্যের স্বাদ নিতে নিতে একসময় আমার গন্তব্য চলে এল।
তাঁরা আরও কিছুটা পথ যাবেন, তাই তাঁদের কাছ থেকে বিদায় নিয়ে আমি প্ল্যাটফর্মে নেমে এলাম।

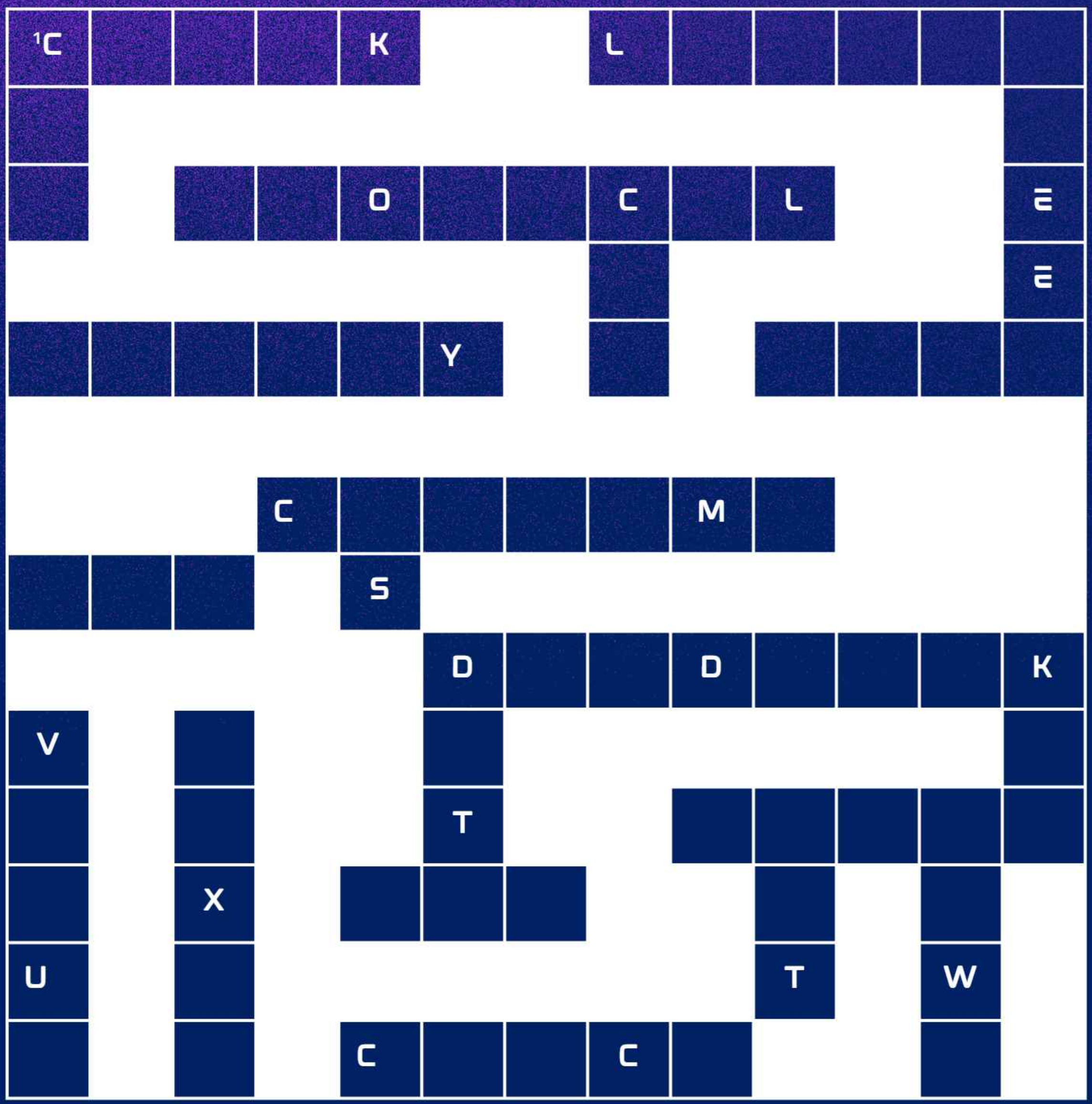
ঘণ্টার এই যে ক্ষণিকের বন্ধন, এটি কী অদ্ভুত সুন্দর! অথচ আমাদের আশেপাশে কত মানুষ আছেন যাদের আমরা চিনি, অথচ তাঁদের সাথেও এমন একাত্মতা তৈরি হয় না। মজার ব্যাপার হলো, তাঁরা আমার নাম জানেন না, আমিও তাঁদের নাম জানি না। সম্পূর্ণ অচেনা লোকজনও কিছু সময়ের জন্য একদম আপন হয়ে যায়, যদিও দুই পক্ষই জানে হয়তো এই জীবনে আর কোনোদিন দেখাই হবে না। ট্রেন সফরের এই ছোট ছোট অভিজ্ঞতাগুলোই
আসলে জীবনের বড় প্রাপ্তি, যা প্রতিবার আমাদের নতুন কিছু শিখিয়ে যায়।

শব্দভ্রমর
CSE, 3rd yr.

STEP INTO

TECHNOLOGY POWERED CROSSWORD

INSTRUCTIONS: SOLVE THE CLUES TO FIND THE HIDDEN CSE TERMS,
IF YOU GET STUCK, TRY "REBOOTING" WITH COFFEE!



CREATED BY MRIGANKA BRAHMA (3RD YEAR)

STEP INTO

TECHNOLOGY POWERED CROSSWORD

CLUES:

ACROSS

1. THE TIMING SIGNAL THAT SYNCHRONIZES ALL CPU OPERATIONS (5 LETTERS)
2. HIDDEN REPRESENTATION SPACE USED IN MACHINE LEARNING MODELS (6 LETTERS)
3. A FORMAL SET OF RULES FOR COMMUNICATION BETWEEN SYSTEMS (8 LETTERS)
4. COMPONENT THAT STORES DATA AND INSTRUCTIONS IN A COMPUTER (6 LETTERS)
5. ERRORS OR FLAWS IN A PROGRAM (4 LETTERS)
6. A VERTICAL FIELD IN A DATABASE TABLE (6 LETTERS)
7. THE SMALLEST UNIT OF DATA IN COMPUTING (3 LETTERS)
8. A STATE WHERE PROCESSES WAIT INDEFINITELY FOR RESOURCES (8 LETTERS)
9. NUMBER SYSTEM USING ONLY 0S AND 1S (6 LETTERS)
10. VOLATILE MEMORY USED FOR ACTIVE PROCESSES (3 LETTERS)
11. CPU TIMING MECHANISM (5 LETTERS)

DOWN

1. THE BRAIN OF THE COMPUTER THAT EXECUTES INSTRUCTIONS (3 LETTERS)
2. A HIERARCHICAL DATA STRUCTURE (4 LETTERS)
3. DATA PROVIDED TO A SYSTEM FOR PROCESSING (5 LETTERS)
4. CURRENT CONDITION OF A SYSTEM OR PROCESS (5 LETTERS)
5. RAW FACTS PROCESSED BY A COMPUTER (4 LETTERS)
6. SMALLEST UNIT OF A DIGITAL IMAGE (5 LETTERS)
7. MALICIOUS PROGRAM THAT REPLICATES ITSELF (5 LETTERS)
8. A BASIC INTEGER DATA TYPE (3 LETTERS)
9. HORIZONTAL ENTRIES IN A DATABASE TABLE (4 LETTERS)

FOR ANSWERS: REFER TO PAGE 58

The Rabbits That Came at Noon

Akanksha kumari(1st year)

It had been a bright sunny day with scorching heat, which was almost expected by the end of March. It had been two days since I fled from my house. I was living in a rented apartment with the money I had saved from my scholarship.

I tried to keep myself busy with household chores to calm my mind. I had only two suitcases with essentials—mostly clothes—and a black backpack that had been with me since the first day of college.

After arranging the folded clothes and making the room look a little like home, I went to the kitchen.
I started spreading chocolate on leftover bread. I didn't really want to eat it, but it was expiring today and I couldn't afford to waste a single penny.

Just then, the doorbell rang.

The sharp sound echoed in the silence and startled me. Before I realized it, I was already near the door—only to notice that I was wearing just shorts and a plain gray baggy T-shirt.
I quickly ran to my wardrobe and pulled on the first pair of pants I found, a pair of jeans.
The bell rang again.

For a moment, I wondered if it was my father. If it were him, he would definitely be happy that I wasn't addressing the guests in indecent clothes.
When I finally opened the door, no one was there.

I stood there, confused and astonished. I clearly heard the bell ring just seconds ago. I bent to look left and right down the corridor, but there was absolutely no one.

I was about to close the door when something soft brushed against my left leg.
I looked down.
I couldn't believe my eyes.

Two rabbits hopped right into my apartment as if they owned the place. They looked playful, almost as if they were laughing and enjoying themselves.

For a moment I just stood there, too tired and frustrated to even react.

Where had they come from? Did someone leave them here? Were they meant for someone else?

I wasn't very fond of animals, but I tried to shoo them away using a cloth, hoping they would run back outside the way they came.
But the rabbits were energetic and mischievous.

Instead of leaving, they started exploring every corner of my flat. They jumped onto the kitchen slab, grabbed my bread, and started nibbling on it. Then they hopped onto the bed while I ran behind them helplessly.

What surprised me the most was how perfectly synchronized they were—always together, always moving in the same rhythm.
After fifteen minutes of chasing them around, I finally gave up.
I left the door half open, hoping they would eventually leave on their own.

Exhausted, I sat down with wo slices of bread the rabbits hadn't touched.
As I ate quietly, my thoughts drifted back to my father.
What must he be thinking now?
Or is he riding all over Haryana on his bike trying to find me?
Or maybe... maybe he is relieved that I was no longer there to burden him.

Lost in my thoughts, I suddenly heard a faint chewing sound.
I followed the sound to my bedroom.

One of the rabbits was on my bed chewing something from my black bag.
I rushed toward it in panic and grabbed the papers from its mouth.
My heart sank.
It was my college admission form.
Half of it had already been eaten.
Tears instantly filled my eyes.
I had left my home, argued with my father, and run away—all for the dream of getting into this college.
And now this?

Was this some kind of punishment from God for leaving my house or for taking too long to make a decision?

I went back to the kitchen and saw the other rabbit sitting on my chair happily chewing the leftover bread.
When I ran toward it, it jumped onto my suitcase.

At that moment I stopped.

I didn't want to scare it anymore.
Instead, I sat down quietly and tried to think.
All day I had been worried about submitting that admission form.
Now I didn't even know if the college was still distributing them.

My phone was lying on a stool nearby.
I picked it up and, after a long moment of hesitation, searched for the college number.

I couldn't let things get worse and had to prove to my father that I am no less than his son who could hardly pass his 10th exams.
I dialed the number.

A soft voice answered from the other side.
My heart started pounding for no reason.
"Hello... can I still get the admission form?" I asked in a shaky voice.

Then she replied, “Forms are no longer available. Are you a candidate? May I know your name?”
“Yes, I’m Sneha Kumari.”

There was another pause.
Then the lady spoke again.
“Sneha... I think your admission was completed a few minutes ago by your father. Do you want me to check it?”

For a moment I felt like I might faint.
There was no way this could be my father.
If he had done this, what would he say to his friend whose son was desperate to marry me?

Then the voice returned.
“Yes, Sneha Kumari. Father: Dharmendra Singh. Your admission has been completed. Your classes begin on 10th April.”
For a second I thought I was dreaming, as I couldn’t believe the words I was hearing.

Tears rolled down my face.

The lady kept saying “Hello? Hello?” until she eventually hung up.

I sat there silently, overwhelmed.
Happy.
Confused.
Thinking about what my father must have been feeling. Did he finally accept?

At that moment, I heard a small click at the door.
One of the rabbits hopped outside.
Before leaving, it glanced back at me as if saying,
“You go, girl.”

Just then, a message popped up on my phone
“घर आ जा बेटा.”
(Come home, my child.)

BACK TO SCHOOL RIDDLES

- বন থেকে বেরল টিয়ে, সোনার টোপর মাথায় দিয়ে।

Shreya Dhar
2nd yr, CSE

- I have no physical form, but I connect two points that cannot see each other. I translate a name everyone knows into a series of numbers that only machines understand. If I stop working, the entire world feels "offline," even if the wires are still plugged in.

Sajal Kumar Ghosh
1st yr, CSE

- Which word is a mile long

- ছোটো বেলায় বস্ত্রধারী, যৌবনে উলঙ্গ, বৃদ্ধকালে জটাধারী, মাঝখানে সুড়ঙ্গ।

Sajal Kumar Ghosh
1st yr, CSE

- "मैं हूँ अदृश्य, पर काम करूँ,
गलती ढूँढूँ, आराम हरूँ,
Program में मैं जब आ जाऊँ,
Coder की नींदें उड़ा जाऊँ।"

Akanksha Kumari,
1st yr, CSE

- তাতো নহে, আমি যে আমার নিজেরই প্রতিবিম্ব।
আমার জন্ম নেই, কিন্তু আমার অস্তিত্ব আছে।
আমি সব জানলেও, সব বুঝতে পারি না।

Abhina Bal
CSE, 2nd yr

For Answers: Refer to page 57

Can We Predict Earthquakes?

A look at what statistics and deep learning can, and cannot, tell us

Suryanshu Paul(1st Year)

Every time a large earthquake strikes somewhere in the world, the same question reappears on news channels and in classrooms. Could we have seen it coming? For an event as sudden and destructive as an earthquake, it almost feels unreasonable that modern science, armed with satellites, supercomputers, and deep learning, still cannot give people a few hours of warning before the ground begins to shake. And yet, that is exactly where we stand today. signal path Despite more than a century of geophysics and a decade of rapid progress in artificial intelligence, reliable earthquake prediction remains one of the great unsolved problems. What has changed recently, and what this article is about, is the way researchers are approaching the problem. Real progress is being made along two parallel paths, one rooted in classical statistics, the other in modern deep learning, and they are starting to meet in the middle.

Earthquakes in one paragraph

Deep inside the Earth, enormous tectonic plates grind against each other at the pace of fingernails growing. Friction holds them in place until the stress becomes too much, and then, suddenly, the rock fractures. The stored energy escapes as seismic waves. Fast P-waves arrive first, slower but more damaging S-waves follow, and surface waves roll through the ground, causing the heavy shakin people actually feel.Seismographs around the world record these waves, producing the time-series data on which everymodel,statistical, neural,eventually feeds. But seismographs only tell us when an earthquake has happened.

The harder question, the one this article is really about, is whether anything in nature can tell us an earthquake is about to happen.

What is a precursor?

A precursor is any signal that shows up before an earthquake and, in principle, warns us that one is coming. Researchers have proposed many candidates over the years. Small foreshocks, radon gas leaking from the ground, shifts in groundwater levels, tiny deformations of the land measured by GPS, anomalies in the Earth's magnetic field, and perhaps the most intriguing of all, disturbances in the ionosphere, the electrically charged layer of the upper atmosphere. The frustrating part is that none of these precursors shows up consistently before every earthquake. Some appear, some do not. Some are mimicked by phenomena that have nothing to do with earthquakes at all. Separating the real signal from the noise is the heart of the problem, and it is exactly where statistics and deep learning now step in.

A signal from the sky

Why does this matter? Because we can actually measure that electron density using ordinary GPS satellites. The quantity we measure is called Total Electron Content, or TEC. When a GPS signal travels from a satellite down to a ground receiver, it cuts through the ionosphere at a slant, giving us Slant TEC (STEC). To compare measurements fairly across different stations and satellites, researchersconvert

it to a vertical equivalent, the Vertical TEC (VTEC), using a simple geometric correction: VTEC =STEC·cos(θ) where θ is the angle of the satellite above the horizon. With networks of hundreds of GPS stations operating around the clock, VTEC has effectively become a global, real-time measurement of the ionosphere

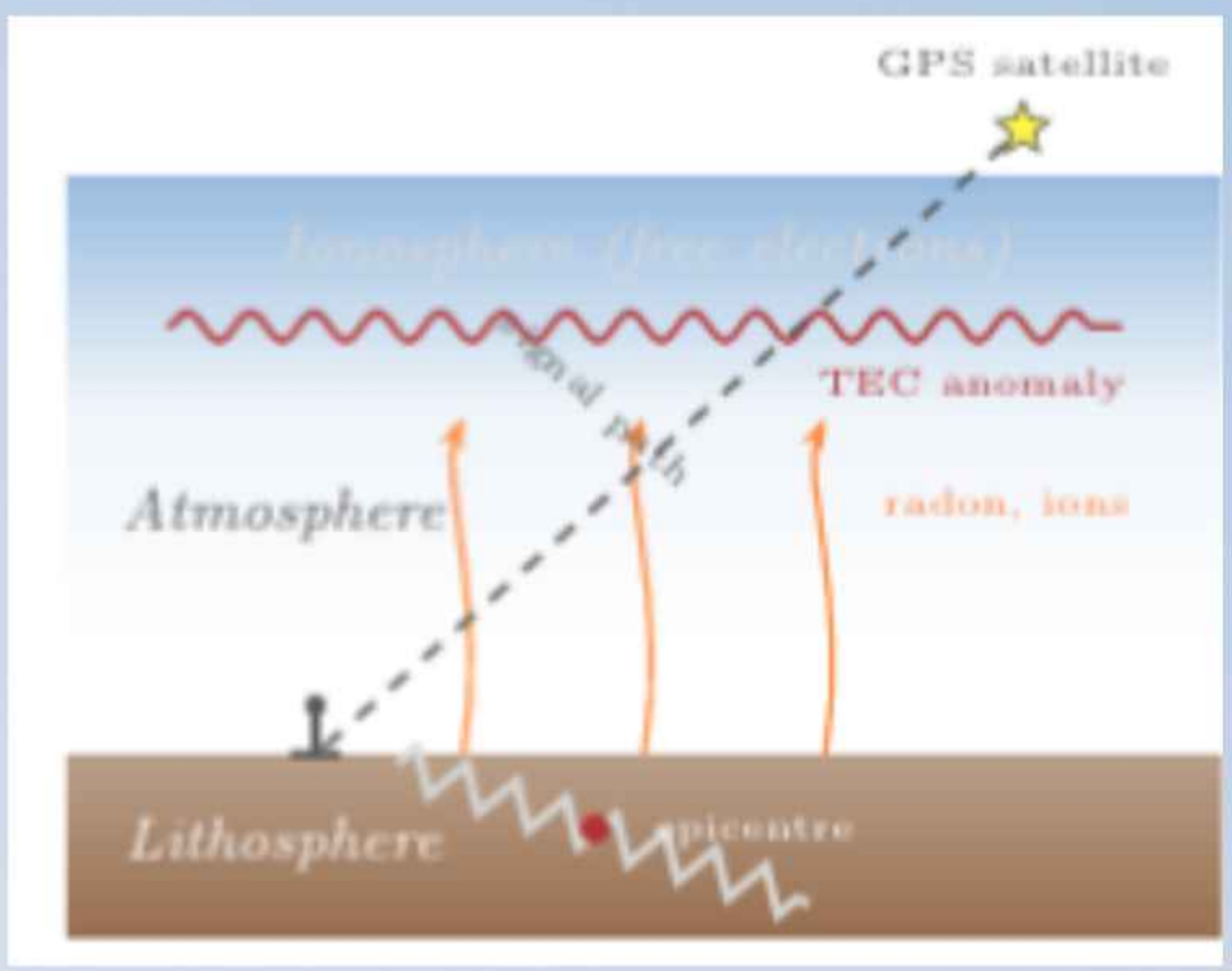


Figure 1. TheLAICmechanisminonepicture. Stress in the lithosphere releases gases that ionise the atmosphere and disturb the ionosphere, producing small but measurable changes in electron density. GPS satellites sense those changes every time their signals pass through.

Why does this matter? Because we can actually measure that electron density using ordinary GPS satellites. The quantity we measure is called Total Electron Content, or TEC. When a GPS signal travels from a satellite down to a ground receiver, it cuts through the ionosphere at a slant, giving us Slant TEC (STEC). To compare measurements fairly across different stations and satellites, researchersconvert it to a vertical equivalent, the Vertical TEC (VTEC), using a simple geometric correction: VTEC =STEC·cos(θ) where θ is the angle of the satellite above the horizon. With networks of hundreds of GPS stations operating around the clock, VTEC has effectively become a global, real-time measurement of the ionosphere

What counts as "unusual"?

Before we can call something an anomaly, we need a definition of normal. Ionospheric TEC changes constantly, with day and night, summer and winter, calm Sun and stormy Sun, so the challenge is to figure out what today's reading is supposed to look like. Sharma and colleagues proposed a wonderfully simple answer[1]. For any GPS station, take the last fifteen days of VTEC measurements and treat that as the local baseline. Compute its mean (μ) and standard deviation (σ), then flag any new reading that falls outside the band $\mu - k\cdot\sigma \le \text{VTEC} \le \mu + k\cdot\sigma$, with the threshold $k = 1.34$, which corresponds to roughly a 90% confidence band. Values above the upper bound count as positive anomalies, and values below it as negative ones. When this test was applied to the days leading up to the Mw 7.2 El Mayor-Cucapah earthquake of April 2010, something genuinely interesting showed up. A clear zone of low TEC density appeared directly above the earthquake epicentre in the days before the main shock. This is the kind of result that keeps earthquake precursor research alive, a real signal, statistically defined, that lines up with a real earthquake. The method is not magic, of course. Solar storms and geomagnetic activity can produce their own anomalies, and every flagged day has to be cross-checked against space-weather indices. But for the first time, the vague intuition of a pre-earthquake ionospheric anomaly had been given a clean, testable definition.

Where deep learning comes in

The statistical approach is elegant, but it rests on an assumption, that normal ionospheric behaviour can be summed up by a mean and a standard deviation. In reality, the ionosphere has rhythms inside rhythms.

Daily cycles, seasonal shifts, solar cycles, local effects, and a pair of numbers cannot capture all of that. This is exactly where deep learning has something to contribute.

Themostnatural tool for this kind of data is the Long Short-Term Memory network, usually just called LSTM. It is a type of neural network built specifically to handle sequences. Unlike ordinary networks, an LSTM has internal memory gates that let it remember useful patterns over long stretches of time while forgetting short-lived noise. Give it a few weeks of TEC data and it will quietly learn the rhythms of the ionosphere, the way a musician learns a melody. Aparticularly clever extension is the LSTM Autoencoder. The idea is elegant. An encoder network squeezes a window of TEC data into a compact summary, and a decoder network tries to rebuild the original from that summary. Train it only on ordinary, non-earthquake data, and it becomes an expert at reconstructing normal behaviour. When you then feed it something truly unusual, it fumbles. The reconstruction is poor, the error spikes, and the model, in effect, says "this doesn't look like anything I have seen before." That reconstruction error becomes a sensitive, data-driven anomaly score. In spirit, this is the same idea as the $\mu \pm k \cdot \sigma$ test, which is to define what normal looks like and then f lag departures from it. The difference is that a deep network learns the definition of normal from the data itself, rather than assuming a Gaussian shape. It can pick up on patterns that a simple mean and standard deviation would wash out. Newer architectures, including Transformer-based models and physics-informed neural networks that bake the laws of the ionosphere directly into their training, are already pushing the field further.

The limits we have to be honest about

None of this, it must be said, amounts to earthquake prediction in the dramatic sense, the "magnitude 7 will hit Kolkata on Thursday at 3 PM" sense. No method, statistical or neural, can do that today. There are good reasons why. Large earthquakes are rare, so training data is scarce. Models that work in one region may stumble in another. Neural networks, for all their power, are hard to interpret, which is a genuine problem when the output might eventually be used to issue public alerts. And ionospheric anomalies, no matter how clean the detection method, can also be caused by solar flares and geomagnetic storms that have nothing to do with the ground beneath us.

What is working, and working beautifully, is earthquake detection and early warning. Japan's Meteorological Agency, the USGS ShakeAlert system on the US west coast, and even Google's Android Earthquake Alerts, which uses the accelerometers inside ordinary smartphones as a distributed sensor network, all detect earthquakes within seconds of their start and push warnings outward faster than the damaging waves can travel. These systems do not predict earthquakes. They outrun them. And a few seconds of warning is enough to stop trains, pause surgeries, and save lives.

So, myth or reality?

Put everything together, and the honest picture is neither fully optimistic nor fully bleak. Statistics gives us a clean, interpretable language for defining what an ionospheric anomaly is. Case studies like El Mayor–Cucapah show that real anomalies do sometimes appear before real earthquakes. Deep learning adds the flexibility to hunt for richer patterns in the same data, and to combine seismic, geodetic, and ionospheric signals in ways that were simply not possible a decade ago. None of these tools solves the prediction problem by itself. Together, though, they are slowly narrowing the space where the problem hides. So if the question is whether we can announce tomorrow's earthquake today, the answer is still no. But if the question is whether we are closer than we were twenty years ago, the answer is very clearly yes. Somewhere between those two answers lies the future of earthquake science, and quite possibly, a few of the people reading this article.

Over to you.

After everything you have just read, the LAIC mechanism, the $\mu \pm k \cdot \sigma$ test, LSTM networks, and the early warning systems already protecting millions of people,
do you think real earthquake prediction will be possible in our lifetime, or will it always stay one step out of reach? There is no right answer. Only a better question.

Reference

[1] Sharma, G., Nayak, K., Romero-Andrade, R., Mohammed Aslam, M. A., Sarma, K. K., & Aggarwal, S. P. (2024). Low Ionosphere Density Above the Earthquake Epicentre Region of Mw 7.2, El MayorCucapah Earthquake Evident from Dense CORS Data. Journal of the Indian Society of Remote Sensing. doi.org/10.1007/s12524-024-01837-x

SUKUNA

JUJUTSU KAISEN

HARSH JAISWAL
CSE, 1ST YR

KERNEL PANIC AT 21:
DEBUGGING A LIFE IN PROGRESS

Nullpointer
CSE, 4th yr

People think Computer Science students build apps, crack codes, and change the world.
In reality, we Google errors, copy code from Stack Overflow, and pray it compiles.

At 21, you don't have life figured out.
You just have 47 Chrome tabs open, 3 pending assignments, and a personality that now revolves around deadlines and Wi-Fi strength.

Somewhere between GATE prep and final-year submissions, you realize:
this isn't a degree—it's a slow, beautifully structured system failure.

1. OPERATING SYSTEMS: PARENTAL CONTROL › ROOT ACCESS

You learned about privilege levels and kernel mode. Cute.

At home, your mom runs on God Mode.
No authentication required. No permissions needed.

You could be in the middle of "serious academic research" (read: scrolling reels), and suddenly—Interrupt.

Non-maskable. Non-negotiable. Non-escapable.

You try a Context Switch:
Alt+Tab → PDF → "Yes Ma, studying Ma."

But she's already executed a full System Scan.
Your lies? Detected.
Your future? Questioned.
Your existence? Under review.

2. COMPUTER NETWORKS: LOVE = PACKET LOSS

Texting your crush is basically running an unstable network protocol.
You send a message.
It gets delivered.
But does it get acknowledged?

Absolutely not. No ACK. No reply. Just emotional packet loss.

You start debugging:

- Maybe it's congestion
- Maybe I'm blocked
- Maybe... I'm the problem

Congratulations. You've just implemented real-time anxiety over UDP.

And when they finally reply after 6 hours with "hmm"?
That's not communication. That's network torture.

3. DBMS: MEMORY IS A TRAITOR

Your brain has the worst database design known to mankind.

Exam syllabus?
Deleted faster than temporary files.

Cringe moment from Class 7? Stored permanently. Backed up. Indexed. Ready for random 2 AM retrieval.

You try to Normalize your life—remove redundancy, clean relationships — but somehow toxic data keeps reappearing like a stubborn recursive function.

And the worst part? You can't even run a DELETE query on your past.

4. THEORY OF COMPUTATION: YOU ARE THE INFINITE LOOP

TOC teaches you about machines with defined states.

Meanwhile, your daily life looks like:

Q0: "I'll start studying early today."
Q1: "Let me just check one video."
Q2: "It's 3 AM. Interesting."

Transition function: poor decisions.
Final state: nonexistent.

At some point, you accept the truth— you're not solving problems anymore.
You are the problem.

5. DISCRETE MATHEMATICS: RELATIONS ARE A SCAM

Reflexive. Symmetric. Transitive.

Nice theory. Doesn't exist in real life.

You put effort → No guarantee of return.
You care → Not necessarily mutual.
You try → System says "undefined behavior."

Life is a weighted graph where every path costs energy, sleep, and self-respect.

And somehow, you still end up stuck in cycles you promised you'd break.

6. COMPUTER ARCHITECTURE: SYSTEM REQUIREMENTS NOT MET

Your brain: high processing capability
Your lifestyle: absolutely incompatible

Sleep? Optional.
Diet? Instant noodles and regret.
Focus? Depends on mood swings and Wi-Fi speed.

You attempt multitasking—lecture + phone + existential crisis.

Result:

- Cache Miss
- Pipeline Stall
- Emotional Segmentation Fault

At this point, even your internal "Control Unit" has given up.

CONCLUSION: HARD RESET RECOMMENDED

At 21, nothing is stable.

Your code breaks.
Your plans break.
Sometimes, you break.

But here's the thing—
even broken systems can reboot.

Close unnecessary tabs.
Kill useless processes.
Stop running background tasks called "overthinking.exe".

Because life isn't about writing perfect code—
it's about making sure it runs... somehow.

NOTE:

If this article felt a little too relatable, there's a chance your logic gates aren't functioning at optimal levels.
Recommended solutions include consulting a senior, increasing caffeine input, or temporarily relocating yourself near the nearest coffee machine for system stabilization.

Answers to the riddles:

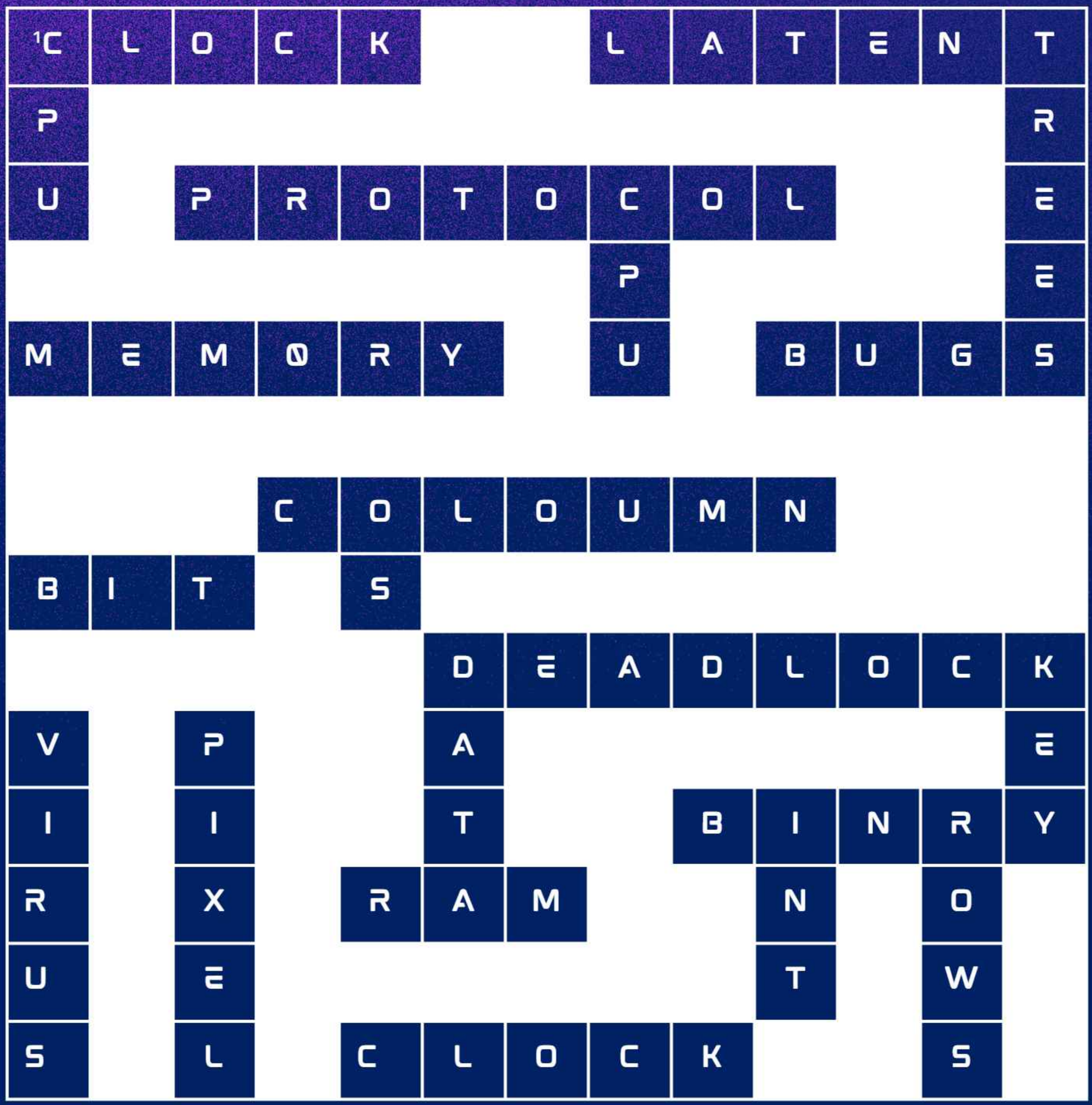
Refer to Page: 32 and 47

- keyboard
- দেশলাই কাঠি
- Map
- Internet(ইংটরনেট)
- Quick Sort
- আনারস
- DNS
- Smiles
- ভুট্টা
- Bug(বগ)
- আয়না

STEP INTO

TECHNOLOGY POWERED CROSSWORD

ANSWERS:



ELIXIR '23 – ANNUAL CULTURAL FEST

FACULTY MEMBERS

Dr. Ananya Kanjilal

Mr. Subhasis Mallick

Mr. Suvadeep Bhattacharjee

Mr. Amlan Raychaudhuri

Ms. Phultuli Sarkhel

Elixir'23, the grand cultural extravaganza was organized on March 24 and 25th at our VIP road campus and 2nd April at New Town Mela Ground. Renowned singer Mr. Anindya Chatterjee had been our Chief Guest. The grand day was serenaded by the outstanding performances of Nakash Aziz, Hricha Narayan and was concluded musically along with DJ Aziz. Students from more than 25 colleges from across the city of Kolkata including IIEST, Heritage, IEM, RCCIIT, St. Xavier's University, Techno India, UEM, GNIT, Narula Institute of technology, Amity University, Adamas had joined. 3500+ students and alumni came together to make this event a grand success. We had experts as guest judges of the events on the final day Sudarshan Chakravorty, Madhabilata Mitra, and Tejas Gandhi. Many well-known personalities, like Samidh Mukherjee, Urvi Chatterjee, Riddhi Sen, conveyed their wishes to the entire Elixir'23 team.

SPORTS

The semifinals and finals of BPPIMT Throwball 2k23 was held on 24th February in West Bengal Volleyball Association Grounds. The final game was played between CSE vs IT. The excitement of the participants could be felt in the air. The encouragements and applauds from the energetic audience contributed significantly to that. Finally, CSE team was declared to be Champions and IT as runners up of the Throwball League.

BPPIMT Intra-college cricket Tournament 2023, was held at NKDA, Cricket ground, New Town. The league matches were held from 22nd to 25th February, 2023. CSE won the winner's trophy. After the final, the much awaited Faculty vs Faculty match was held. Prize distribution ceremony was there at the end of all the matches. Alongside the winner's and runner's of the cricket tournament, the Girls' Throwball champion- CSE and the runner-up IT were felicitated. Overall, the whole event was a grand success.

ORIENTATION PROGRAM OF 2023-27 BATCH

The Orientation Program for the 2023–27 batch marked the formal commencement of an important academic journey, setting the tone for the years of learning, growth, and exploration that lie ahead. Designed as a comprehensive introduction to the institution's academic culture, values, and opportunities, the program served as a bridge between the excitement of new beginnings and the responsibilities of collegiate life. It brought together faculty members, administrative leaders, and senior students to welcome the incoming cohort into a community built on collaboration, discipline, and intellectual curiosity.

The event began with an inaugural address that highlighted the institution's legacy, academic philosophy, and commitment to nurturing well rounded individuals. Speakers emphasized the importance of critical thinking, ethical conduct, and active participation in both curricular and extracurricular domains. Their words provided clarity on expectations while inspiring confidence among the new students as they prepared to transition into a more independent and self driven learning environment.

Informative sessions followed, covering academic regulations, evaluation methods, campus facilities, and student support systems. Dedicated segments introduced various clubs, technical societies, cultural forums, and innovation cells, encouraging students to engage beyond the classroom and discover their interests. Interactions with faculty advisors offered reassurance and guidance, helping students understand the resources available to them throughout their academic tenure.

Equally significant was the opportunity for peer connection. Ice breaking activities and informal discussions fostered an atmosphere of inclusivity, allowing students from diverse backgrounds to form early bonds and develop a sense of belonging. The enthusiasm visible throughout the program reflected the collective anticipation of a cohort ready to learn, collaborate, and contribute.

The Orientation Program ultimately served not merely as an informational session but as a foundational experience that instilled purpose and direction. By aligning expectations, clarifying pathways, and welcoming students into a supportive academic ecosystem, it laid the groundwork for a transformative four year journey defined by knowledge, resilience, and achievement.

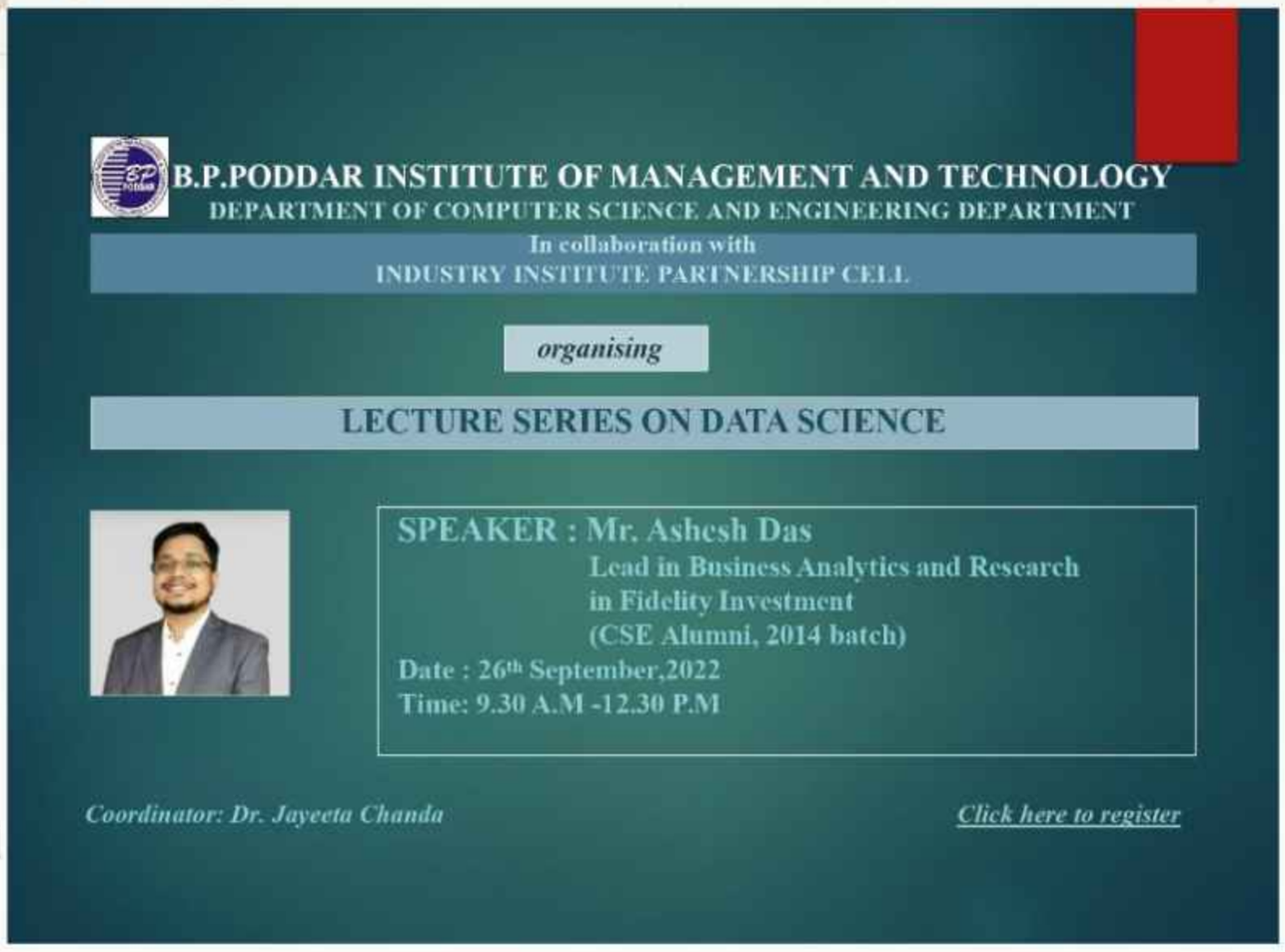
WALL MAGAZINE INAUGURATION "STEPPING STONES"

The inauguration of the Wall Magazine "Stepping Stones" marked a proud and memorable moment for the first-year B.Tech students, symbolizing the beginning of their creative journey beyond the boundaries of classrooms and textbooks.

Aptly titled "Stepping Stones," the magazine reflected the spirit of new beginnings, aspirations, and the determination to move forward with confidence and imagination. The event was graced by the esteemed presence of the Principal, whose encouraging words inspired the young minds to continue nurturing their talents alongside their academic pursuits. The vibrant display of artwork, poems, short stories, essays, and thought-provoking write-ups beautifully showcased the artistic and literary brilliance of the students. Each contribution carried a unique perspective, blending innovation with emotion and highlighting the diverse talents within the batch. The colorful presentation of the wall magazine transformed an ordinary space into a lively canvas of ideas and expressions, drawing admiration from faculty members and fellow students alike. More than just an exhibition, the inauguration celebrated creativity as an essential part of holistic education, emphasizing that learning is not confined to books but flourishes through imagination and self-expression. "Stepping Stones" thus became a symbol of confidence, collaboration, and the courage to share one's voice, leaving a lasting impression and setting the tone for many more creative endeavors in the years to come.

SEMINARS & WORKSHOPS

The department of Computer Science and Engineering with the partnership of the Industry Institute Partnership Cell has organised a lecture session on 26th September 2022. The speaker was Mr. Ashesh Das Lead in Business Analytics and Research in Fidelity Investment.
It was a very engaging session giving an insight into what is being practiced in the industry in this field. This was the 1st part of this lecture series which will be continued with more sessions on the coming days.



The department of Computer Science and Engineering of the institute organised a gap lecture session for Software Engineering on the topic named Human Centric Design. The speaker was Dr. Soumya S. Basu from Sheffield Hallam University, Sheffield, UK. Over 100 no. of students from 3rd year attended the session. It was an engaging and informative session enlightening students on industry relevant practices.

The Department of Computer Science and Engineering, in collaboration with the Industry Institute Partnership Cell, organized a one-day workshop on the topic "Cross-Domain Recommender System and Analytics Using Data Science" on 20th October 2021. The workshop was conducted by Ardent Computech Pvt. Ltd. and aimed to introduce students to emerging trends and advanced concepts in modern computer technologies. The session was designed as a combination of theoretical lectures and live coding presentations, which helped students understand both the conceptual and practical aspects of recommender systems and data science analytics. The speakers explained how cross-domain recommender systems work and how data science techniques are used to analyze large datasets and generate intelligent recommendations across different domains. The workshop focused on providing students with knowledge about new and upcoming technological areas that are highly relevant in the industry. It also helped students understand the current industrial requirements and the skills needed to build successful careers in the field of data science and analytics. The interactive nature of the session encouraged students to actively participate and gain hands-on exposure to the concepts discussed. Overall, the workshop proved to be highly informative and beneficial for the participants. The enthusiastic response from the students greatly contributed to the success of this one-day workshop organized by the department.

Triumphs

Students of the Department of Computer Science and Engineering of BPPIMT achieved a remarkable success by winning the First Prize in “Rural-Le-Carte” at Amiphoria 2023, the annual fest organized by Amity University. Suryansh Gupta and Komal, representing the CSE department, participated in a business idea pitching event where they presented their innovative concept titled “VRAMAN.” The idea focused on an eco-tourism venture aimed at promoting sustainable tourism while improving the livelihoods of local communities in rural areas. During the event, the students confidently presented their business proposal before a panel of judges and investors. They explained the concept, potential impact, and sustainability of their venture, highlighting how it could benefit both tourists and the local population. Along with pitching the idea for investment, they also effectively marketed their project to the panel members. Their creativity, presentation skills, and innovative approach impressed the judges, ultimately earning them the first prize and bringing pride to the institution.

PLACEMENT EXCELLENCE – A YEAR OF REMARKABLE ACHIEVEMENTS

The placement season has consistently reflected the institution's commitment to excellence, resilience, and industry readiness. Over the past academic cycles, the steady rise in opportunities and student success stories stands as a testament to a strong academic foundation combined with industry-aligned training.

With over 130 eligible students and more than 100 placement offers in the current cycle, the placement ecosystem demonstrates both depth and diversity. Notably, students have secured positions across leading global organizations, showcasing a wide spectrum of talent ranging from technical expertise to business acumen.

A key highlight of this year's placement drive is the significant number of high-value offers, with top recruiters extending packages reaching up to 11 LPA, alongside consistent average packages that reflect strong employability. Prestigious companies such as IBM, Johnson Controls, HSBC, and Nomura have recruited multiple candidates, reinforcing industry trust in the institution's talent pool.
The top achievers, including Megha Kumari, Shreya Chakraborty, Ankur Bhowmick, and Krittika Majumdar, secured premium offers from IBM, setting a benchmark of excellence. Close behind, students like Tathagata Kar, Arijeet Kumar Nayak, and Manshi Kiradoo achieved outstanding placements at Johnson Controls with competitive packages.

Equally impressive is the strong representation in global financial and consulting firms. Students such as Srijani Chaudhury, Sreejita Banerjee, and Disha Kapoor secured positions at HSBC, while a significant cohort excelled at Nomura, reflecting strength in analytical and finance-oriented roles.
Beyond top-tier offers, the placement season highlights inclusivity in opportunities, ensuring that a large number of students secure meaningful roles. The presence of companies like BYJU'S, PwC, Accenture, EY, Infosys, and Cognizant underscores a balanced mix of IT, consulting, analytics, and core sector roles.

This year also witnessed over 350+ paid internship opportunities, providing students with early industry exposure and enhancing their employability. The transition from internships to full-time offers further strengthens the placement pipeline.

CELEBRATING ACHIEVEMENTS & CAREER MILESTONES

We are proud to recognize the remarkable accomplishments of our students, whose dedication and perseverance have led them to prestigious organizations and esteemed academic institutions. Their success stands as an inspiration to their peers and a testament to their hard work.

FEATURED ACHIEVERS:

- AINDRILA DAS – ROYEL RESEARCH
- HRITIKA RAO – ACCENTURE
- SANGITA MUKHERJEE – JIO
- SRIJANI CHAUDHURY – HSBC
- SRIJA BHATTACHARJEE – KOVIER
- VANSHIKA MAHANSARIA – ACCENTURE
- RITIKA MANDAL – NUCLEUS

HIGHER STUDIES & COMPETITIVE ACHIEVEMENTS:

- KISHAN SEKSARIA – GRE, TOEFL | MS, UNIVERSITY OF SOUTHERN CALIFORNIA
- SUCHISMITA SARKAR – GATE | M.TECH, JADAVPUR UNIVERSITY
- PRITAM DE – GATE AIR 99 | M.TECH (CS), IIT MADRAS
- CHAYAN PATHAK – GATE | M.TECH (CS), IIT BHILAI
- AYUSH AGARWAL – GATE | M.TECH (CS), IIT BHU
- KUHELI BANIK – M.TECH (DATA SCIENCE), BPPIMT MAKAUT
- ANIRUDDHA BASAK – MS, GERMANY

PROFESSIONAL PLACEMENT:

- PANKAJ SHARMA – TCS

Their achievements reflect not only academic excellence but also determination, resilience, and a drive to succeed. We extend our heartfelt congratulations and wish them continued success in all their future endeavors.

CONCLUSION

As we reach the final pages of Anvaya 2022–23, we look back with pride on the ideas, achievements, creativity, and dedication that define the spirit of the Computer Science & Engineering Department. This magazine is not merely a collection of writings and memories, but a reflection of talent, teamwork, innovation, and continuous learning.

Every contribution in these pages represents enthusiasm, hard work, and the desire to grow beyond boundaries. We hope this edition inspires readers to explore new possibilities, think creatively, and strive for excellence in every field.

With gratitude to all contributors, faculty members, and students, we conclude this edition with the hope that Anvaya will continue to grow stronger each year and remain a cherished symbol of our department's journey and achievements.