

# TECH GURU'26

DEPARTMENT OF INFORMATION TECHNOLOGY



**K.S.RANGASAMY**  
**COLLEGE OF TECHNOLOGY**  
AUTONOMOUS | TIRUCHENGODE



**K.S.RANGASAMY COLLEGE OF TECHNOLOGY**  
**DEPARTMENT OF INFORMATION TECHNOLOGY**

**VISION :**

To emerge as an Information Technology knowledge hub by imparting quality education, promoting research and innovation.

**MISSION :**

- To provide holistic education through curriculum update, inspired and experiential learning
- To mould the students as responsible professionals to compete with the emerging global challenges

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

**PEO1:** Core Competence: Graduates will have core competence in engineering fundamentals and computing to solve hardware and software engineering problems

**PEO2:** Successful Career: Graduates will demonstrate successful professional practices in industry, academia and e-governance

**PEO3:** Ethics and life-long learning: Graduates will continue to advance in their career through life-long learning with a social and ethical concern

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

Engineering graduates will be able to:

**PSO1:** Develop IT infrastructure: Develop suitable IT infrastructure in diverse domains through acquired foundation skills and knowledge

**PSO2:** Design / Develop software products: Apply necessary tools and methodologies to design and develop software products

**PSO3:** Innovative Career: Create a zest for innovative career path through value-based software courses and entrepreneurial skills resulting in competent IT solution providers

# PROGRAM OUTCOMES :

## Engineering Graduates will be able to:

**PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage

# Table of Content

S.No	CONTENT	Page No
1	<b>Trend.exe</b>	
	Echoes of Infinity	1
	AI Hallucination: Why It Happens & How to Fix It	2
	Data Without Limits	3
	Federated Learning	4
	AIoT: The Next Big Revolution	5
	Synthetic Data Generation	6
	Retrieval Augmented Generation	7
	Multimodal AI – Integrating Text, Image, and Video	8
	The Renaissance of synergistic engineering: github as an autonomous ecosystem	9
	Overthinking - My Biggest	10
	Life of an Engineer - Built not given	11
	AI Model Compression Techniques	12
	Flux: A Language for Programming High-Performance Servers	13
	Evaluating LLMs for Code Generation in HRI	14
	The Case of Netflix	16
	MATLAB in Chemistry	21
2	<b>CODING PUZZLES</b>	22

3	<b>LOGICAL PUZZLES</b>	
	Riddles in Code	27
	Logic Challenge	28
	Cyber Mystery	29
4	<b>PROJECT SPHERE</b>	31
5	<b>SHARP TANK</b>	38
6	<b>MEMES</b>	42
7	<b>Literature Perals</b>	46

# EDITORSVOICE

“To accomplish great things, we must dream as well as act.” This inspiring thought has always motivated us to move forward with determination and confidence. As students of B.Tech (Information Technology), we began our magazine journey with the introduction of IGNITE, which kindled the enthusiasm among us, the ZITAIans, to successfully publish TECH GURU'12 and TECH GURU'13 in the following years.

With every passing year, TECH GURU has grown stronger, and we are delighted to present the latest edition, TECH GURU 2026. Our magazine has become a valuable contribution to the world of technology, featuring articles from diverse domains. Each edition is carefully curated to provide readers with meaningful knowledge, fresh ideas, and insightful perspectives.

This achievement would not have been possible without the sincere efforts of our dedicated team and the constant encouragement of our respected faculty members. We are truly fortunate to have such motivating mentors. I would like to express my heartfelt gratitude to Dr. R. Poonkuzhali, Professor & Head of the IT Department, and Dr. J. Nithya, Professor, whose guidance and support have played a vital role in the success of this magazine.

TECH GURU is more than just a magazine; it is a reflection of our collective efforts and a platform to share innovative ideas, creativity, and technological advancements. We sincerely hope that every article inspires our enthusiastic readers and contributes to their learning and growth.

Finally, I extend my gratitude to all ZITAIans and my classmates for their continuous support and encouragement. Your valuable contributions and feedback have always been a source of strength to us. We look forward to your thoughts and suggestions for future editions.

Kindly send your feedback to [\*\*techguru.zita@gmail.com\*\*](mailto:techguru.zita@gmail.com).

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# Trend.exe



# ECHOES OF INFINITY

## *From Ancient Thought to Digital Realities*



In a world driven by logic, algorithms, and relentless technological evolution, the human mind continues to wander beyond the boundaries of circuits and code, venturing into realms that are abstract, philosophical, and profoundly infinite. One such fascinating idea is the concept of the “multiverse”—a notion that has captivated thinkers across disciplines. While it often finds its roots in theology and ancient philosophical interpretations of existence, it also echoes, in an unexpected yet intriguing manner, within the corridors of Information Technology. From a theological lens, the multiverse is not merely a scientific hypothesis but a poetic reflection of boundless creation. It evokes visions of multiple realms, dimensions of existence shaped by divine will, and realities that transcend human comprehension. These ideas, preserved through centuries in spiritual discourses and traditional narratives, invite us to question the very nature of reality, identity, and purpose. They paint a picture of existence that is not singular or linear, but layered, dynamic, and infinitely expansive. Interestingly, as we step into the digital era, the world of Information Technology mirrors this expansiveness in its own distinctive language. Virtual machines, cloud ecosystems, parallel processing, and simulated environments create spaces where multiple “worlds” can coexist, operate, and evolve independently. Each system runs its own logic, its own rules, yet all are interconnected within a larger framework. What was once a philosophical abstraction begins to take a tangible, almost experiential form through technology. This convergence of ideas is about acknowledging the common human curiosity that drives both fields rather than making direct analogies. In essence, both the theologian contemplating invisible worlds and the IT specialist creating intricate systems are investigating the concept of “what lies beyond.” These seemingly disparate areas are connected by their common goal of growth—of pushing boundaries and redefining them.

As we continue to innovate and imagine, perhaps the most remarkable realization is that technology does not replace philosophical wonder—it amplifies it. The screens we code on and the systems we build may very well be modern reflections of age-old questions, reimagined in binary and logic. And in this beautiful interplay between thought and technology, we find not just answers, but a deeper sense of curiosity. Ultimately, whether we draw wisdom from sacred texts or utilize advanced software, the mission is clear: to delve into the infinite, grasp the unknown, and revel in the boundless potential of existence.



## AI HALLUCINATION: WHY IT HAPPENS & HOW TO FIX IT

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### Understanding AI Hallucination:

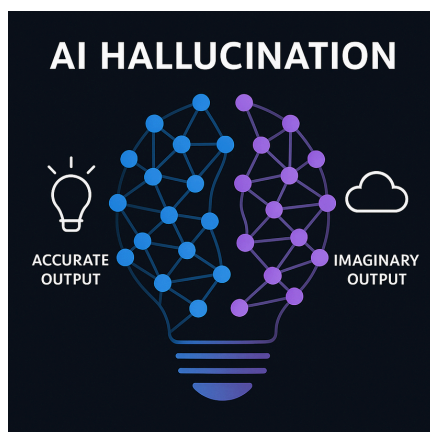
Why It Happens and Where It Doesn't

Artificial Intelligence (AI) has become an essential part of modern life. It is used in chatbots, virtual assistants, healthcare systems, education platforms, and even in business decision-making. AI helps improve efficiency, saves time, and provides quick solutions to complex problems. However, despite its advantages, AI is not always accurate.

AI hallucination refers to a situation where an AI system generates incorrect, misleading, or completely fabricated information while presenting it confidently as if it were true. For example, a chatbot might provide wrong facts, generate fake references, or give an answer that sounds logical but is actually false. Since AI responses are often fluent and convincing, users may trust them without verification, which can lead to serious consequences.

There are several reasons why AI hallucination occurs. First, AI models are trained using large datasets collected from various sources. If the data is incomplete, outdated, or biased, the AI learns incorrect patterns and may produce inaccurate outputs. Second, AI does not truly “understand” information like humans. Instead, it works by predicting the next word based on probability and patterns. This prediction-based approach can sometimes lead to errors or irrelevant responses.

Another important reason is ambiguous or unclear user input. When users ask vague or complex questions, AI may try to guess the answer instead of asking for clarification, resulting in misleading information. Additionally, some AI systems do not have access to real-time updates, so they may provide outdated or incorrect answers. Overconfidence in response generation is also a factor, as AI is designed to always provide an answer, even when it is uncertain.



In conclusion, AI hallucination is a significant challenge in the development of intelligent systems. While AI is powerful and highly useful, it is not perfect and should be used responsibly. Continuous improvements in technology, combined with careful human supervision, can reduce hallucinations and increase trust in AI systems. As AI continues to evolve, solving this issue will play a crucial role in making it more reliable for future applications.



# DATA WITHOUT LIMITS



## HOW SNOWFLAKE WORKS

Snowflake is a cloud-based data platform that people use to store and manage a lot of data. It is different from databases because it works only in the cloud. This means that Snowflake separates the place where it stores data from the power it uses to do things. So companies can make it bigger or smaller depending on what they need. This helps them work better and save money. Snowflake is also very flexible so people only pay for what they use. This is why a lot of businesses like Snowflake those that deal with a lot of data. Snowflake can handle kinds of data like JSON and XML which makes it easy to put information together from different places.

One of the things about Snowflake is that it makes it easy to share data with other people. It does this in a way so people can look at the same data in real time. This helps teams work together better and makes sure everyone has the information. Snowflake was made by Snowflake Inc.. It is used in a lot of industries like finance and healthcare. It also works well with tools, like Python and Tableau which is great for people who analyze data. Snowflake also takes care of some tasks on its own like making sure everything runs smoothly which helps the people in charge of the database.

In the end Snowflake is a good cloud data platform that makes it easy to store and analyze data. It is very good at making things bigger or smaller. It is safe and easy to use. This is why it is an important tool for businesses today. As more and more data is made Snowflake helps companies make decisions based on what they know. Snowflake is very helpful, for companies that use a lot of data. It is a key part of how they work.

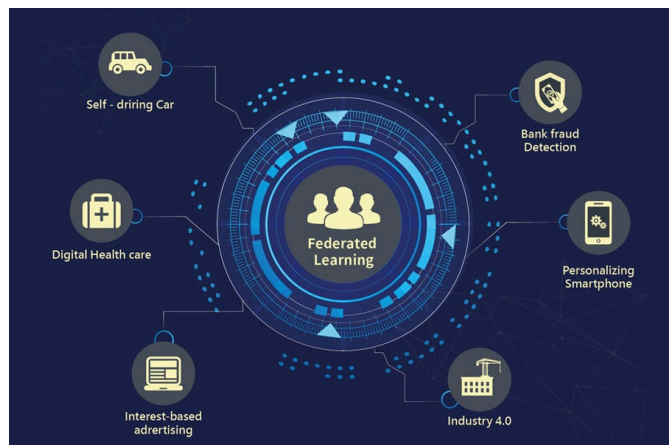


# FEDERATED LEARNING

Federated Learning is an advanced machine learning technique that enables training of artificial intelligence (AI) models across multiple devices without sharing raw data.

In traditional machine learning approaches, data from users is collected and sent to a central server for processing and model training.

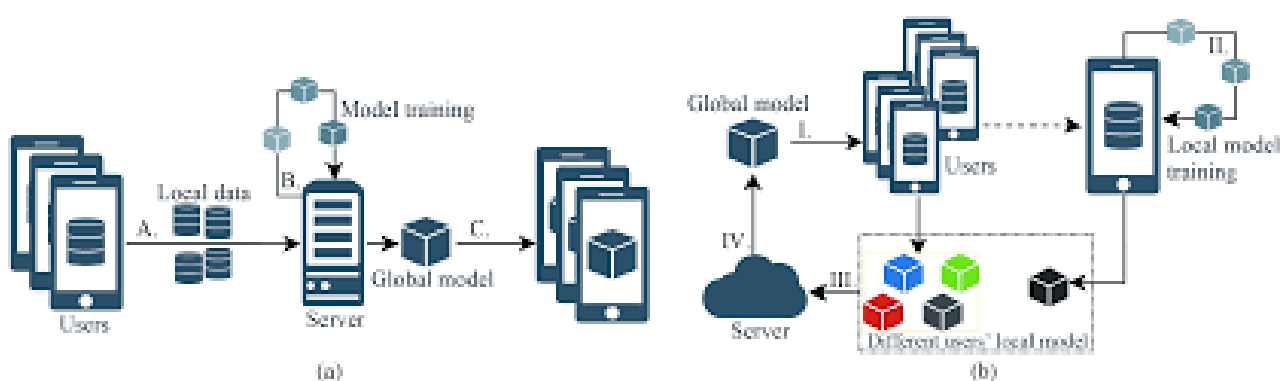
However, this method raises serious concerns regarding data privacy, security, and misuse of personal information.



Federated Learning addresses these challenges by introducing a decentralized approach to model training.

In Federated Learning, instead of transferring user data to a central server, the AI model is sent to user devices such as smartphones, laptops, or edge devices. These devices train the model locally using their own data. After the training process, only the updated model parameters or weights are sent back to the central server. The server then aggregates these updates from multiple devices to improve the global model. This process ensures that sensitive user data never leaves the device, thereby maintaining privacy and confidentiality.

One of the major advantages of Federated Learning is enhanced data security. Since personal data is not transmitted over networks, the risk of data breaches and unauthorized access is significantly reduced. This makes Federated Learning highly suitable for applications in sensitive domains such as healthcare, finance, and personal communication systems. For instance, in healthcare, patient data can be used to train models for disease prediction without exposing confidential medical records. Similarly, in financial systems, transaction data can be analysed securely to detect fraud.



A common real-world example of Federated Learning is its use in smartphone keyboards. Applications like predictive text and autocorrect improve over time by learning from user typing patterns without accessing or storing actual messages. This ensures that user privacy is preserved while still enhancing user experience.

Despite its advantages, Federated Learning also faces certain challenges. These include high communication costs due to frequent updates, differences in device capabilities, and potential security risks related to model updates. However, ongoing research and advancements are addressing these limitations.

# AI + IOT (AIOT): THE NEXT BIG REVOLUTION



**AIoT**, the combination of Artificial Intelligence and the Internet of Things, is changing how technology works in our daily lives. It is not just about connecting devices anymore, but about making them intelligent enough to understand data and respond automatically. IoT devices collect real-time information through sensors, and AI helps in analyzing that data to make smart decisions. This can be seen in applications like smart homes, healthcare monitoring, and industrial systems, where technology adapts to human needs and improves efficiency.

AIoT reduces manual effort, saves time, and increases accuracy in many processes. At the same time, it also brings challenges such as data security and system complexity, which need careful attention. As technology continues to grow, AIoT is becoming an important part of building smarter and more connected systems. For students and future developers, it opens up exciting opportunities to create innovative solutions that can make a real difference in society.

# SYNTHETIC DATA GENERATION

**"Synthetic data enables smart AI without risking real data."**



Synthetic data generation involves creating artificial data that replicates real-world data patterns without using actual sensitive information. This article explores different techniques, including AI-based generative models, and their applications in various domains. Synthetic data helps overcome data scarcity, ensures privacy, and supports efficient training of machine learning models.

In machine learning, large amounts of data are required to train accurate models, but collecting real-world data can be costly and restricted due to privacy concerns. Synthetic data generation provides a solution by creating artificial data that closely resembles real data without exposing sensitive information. This approach enables safe and scalable model development across various domains.



Synthetic data generation involves creating artificial data that mimics real-world data using statistical and AI-based techniques. Methods such as Generative Adversarial Networks (GANs) and simulation models are commonly used to produce realistic datasets. These datasets can be used for training and testing machine learning models without relying on real data. In real-world applications, synthetic data is widely used in healthcare, autonomous vehicles, and cybersecurity. For example, self-driving cars use simulated environments with synthetic data to train models for safe navigation without real-world risks.

Synthetic data generation provides an effective solution for data scarcity and privacy issues in AI development. By creating artificial yet realistic datasets, it enables safe, scalable, and cost-efficient model training. Its importance will continue to grow as industries demand more secure and diverse data.

# RETRIEVAL AUGMENTED GENERATION (RAG)

Retrieval-Augmented Generation (RAG) is a modern AI technique that improves the performance of language models by combining them with external knowledge sources. Instead of relying only on pre-trained data, RAG systems retrieve relevant information from databases, documents, or the internet and then generate responses based on that information. This makes the output more accurate, relevant, and up to date.

## How RAG Works

RAG follows a simple three-step process:

1. **User Query** – The user asks a question.
2. **Retrieval** – The system searches for relevant information from a knowledge base.
3. **Generation** – The language model uses the retrieved data to generate a response.

For example, if a user asks about a company's latest policy, a normal AI model may not know the answer. But a RAG system can retrieve the latest document and generate the correct response.

## Importance of RAG in Real Applications

### 1. Accurate and Updated Information

Traditional AI models are trained on fixed datasets and may not know recent updates. RAG solves this by fetching real-time or recently stored data. This is especially useful in fields like news, finance, and technology.

### 2. Domain-Specific Knowledge

Many industries require specialized knowledge. RAG allows systems to use company-specific or domain-specific documents. For example, a hospital system can use medical records and clinical guidelines to provide accurate suggestions.

### 3. Reduces Hallucination

Sometimes AI models generate incorrect or made-up answers. RAG reduces this problem by grounding responses in actual retrieved data.

### 4. Cost-Effective and Scalable

Instead of retraining a model whenever new data is available, RAG systems simply update the knowledge base. This saves time and computational cost.

## Components of a RAG System

A typical RAG system includes:

- **Document Store:** Stores data like PDFs, text files, or databases
- **Embedding Model:** Converts text into numerical vectors
- **Vector Database:** Stores embeddings for fast search
- **Retriever:** Finds relevant documents based on the query
- **Generator (LLM):** Generates the final answer

These components work together to provide accurate and meaningful responses.

## Real-World Applications

### 1. Customer Support Chatbots

RAG is widely used in customer service. Companies build chatbots that retrieve information from FAQs, manuals, and databases.

### 2. Healthcare Systems

In healthcare, accurate information is critical. RAG systems help doctors and staff access reliable data.

### 3. Legal Industry

Lawyers need to analyse large amounts of documents. RAG helps in retrieving relevant legal information quickly.

## Multimodal AI - Integrating Text, Image, and Video



Multi-modal AI enables systems to process and integrate multiple types of data such as text, images, audio, and video. This article highlights the working principles, applications, and advantages of multi-modal systems in real-world scenarios. By combining different data modalities, these systems achieve improved accuracy and more human-like understanding, making them a key advancement in modern AI.

Most traditional AI systems are designed to process a single type of data, such as text or images. However, real-world scenarios involve multiple forms of information. Multi-modal AI is an advanced approach that combines different data types like text, images, audio, and video to improve understanding and generate more accurate results, making it a key development in modern AI.

Multimodal systems combine different neural networks to process text, images, audio, and video.

These systems learn relationships between different data types to produce more accurate outputs.

Applications include image captioning, video analysis, virtual assistants, and medical diagnosis.

For example, a multimodal system can analyze medical images along with patient records to provide better insights.

Despite their advantages, multimodal systems require large datasets and high computational power, making them complex to develop and deploy.

Multi-modal AI works by combining different types of data such as text, images, audio, and video into a single system. Each data type is processed using specialized models, and the extracted features are integrated to generate a unified and more accurate output. This approach enables better understanding compared to single-modality systems.

Multi-modal AI enhances machine intelligence by integrating multiple types of data such as text, images, and video. This leads to more accurate understanding and richer outputs. As technology advances, multi-modal systems will become a foundation for next-generation AI applications.

# THE RENAISSANCE OF SYNERGISTIC ENGINEERING: GITHUB AS AN AUTONOMOUS ECOSYSTEM

GitHub is orchestrating a seismic shift in the software landscape, transmuted from a static repository into a Cognitive Development Environment. By weaving artificial intelligence into the very fabric of version control, the platform has moved beyond simple storage to Agentic Orchestration. Here, AI-led ecosystems—spearheaded by Copilot—act as a high-level architect, distilling petabytes of repository data into actionable insights. These systems don't just "assist"; they anticipate, recommending bespoke refactoring trajectories and fortifying codebases with predictive security patches that preempt vulnerabilities before they are even committed. This shift ensures that software is not merely functional but inherently architecturally resilient.

## ***The Rise of the "Silicon Mentor"***

The modern workflow has integrated Autonomous Code Reviewers that act as the digital conscience of a project. These virtual collaborators provide instantaneous, granular feedback on Pull Requests, demystifying the "black box" of legacy codebases with surgical precision. By automating the mechanical drudgery of unit testing, dependency management, and linting through advanced CI/CD pipelines, GitHub has liberated the human intellect. Developers are no longer bogged down by syntax; they are empowered to serve as Systems Strategists, focusing on the creative high-ground of logic and user-centric design.

## ***Democratizing the Digital Frontier***

GitHub has emerged as a powerful engine for meritocratic inclusivity. Through real-time linguistic translation and the lowering of technical barriers via low-code automation, it has effectively "de-geographized" talent. The platform facilitates a borderless collaboration where a self-taught enthusiast in a rural village can contribute to mission-critical infrastructure alongside a lead architect in a tech hub. This democratization ensures that the global "brain trust" is no longer restricted by language, location, or socioeconomic status, but is governed purely by the quality of the contribution.

## ***The "Verifiable Competence" Paradigm in Recruitment***

For the modern professional, GitHub has redefined the Placement Protocol. We are moving away from the era of the "Self-Proclaimed Resume" and into the era of Empirical Validation.

- **Data-Driven Forensics:** Machine learning analytics now allow recruiters to perform a "biopsy" of a candidate's technical DNA—validating logic consistency, security consciousness, and collaborative empathy through actual commit history.
- **Predictive Project Health:** Advanced algorithms can now forecast Technical Debt trends, allowing companies to hire individuals who don't just "write code" but who maintain the long-term "vitality" of a digital product.

## ***The 2026 Competitive Edge***

To thrive in this evolving market, your GitHub profile must reflect Curation over Quantity. Recruiters are searching for developers who demonstrate Intentional Engineering—those who use AI as a force multiplier to manage complex, secure, and globally-accessible systems.

### **The Verdict**

GitHub is no longer a choice; it is the Sovereign Workspace for the modern engineer. To embrace its intelligent features is to move from being a mere "coder" to becoming an Architect of the Future, equipped to build scalable solutions in an increasingly automated world.

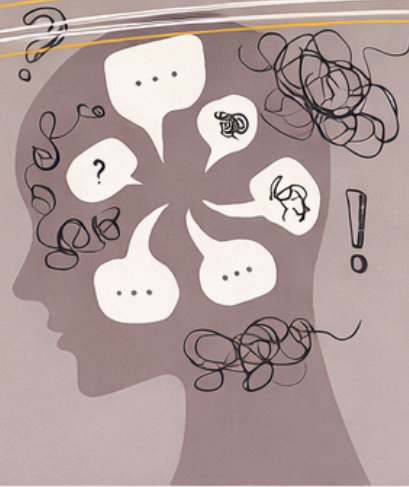


## Solutions to overcome Overthinking

- Focus only on what you can control and let go of the rest.
- Take action instead of thinking too much, even if it's a small step.
- Keep yourself engaged with productive activities to avoid unnecessary thought loops.
- Practice calming techniques like deep breathing or mindfulness meditation to ground yourself.
- Remind yourself that not everything you overthink is likely or important.

## Personal Coping

- Write down your worries to gain clarity. Journaling can help.
- Set a 'worry time'—designate a specific time for 10-15 minutes to let out all your worries, so you're not constantly ruminating. Telling yourself, 'I'll worry about this later,' when outside that time, unless it is urgent or important.



## What I've gone through cause of Overthinking:

Overthinking didn't just stay in my head—it slowly started taking control of my life. There were nights where I lay in bed, fully tired, but still couldn't sleep because my mind just wouldn't stay quiet. The same thoughts kept playing again and again—things I said, things I wish I had said, and even things that might never happen.

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Slowly, it started affecting my confidence. I began to doubt even the smallest decisions. Simple things started feeling confusing, I knew what I had to do, but I still kept hesitating, like I felt like my own mind was stopping me.

I lost courage in moments where I should have stepped forward. Fear of what others might think and fear of failure became stronger than my abilities. Because of that, I missed many chances—not because I wasn't capable, but because I kept overthinking everything.

The worst part was the mental tiredness. Even without doing anything physically, I felt drained. My mind was always running, moving from past mistakes to future worries, never letting me stay in the present.

At one point, I realized something hard—overthinking wasn't helping me or protecting me. It was slowly taking away my peace, my confidence, and my ability to just live in the moment.





## — Life of an Engineer — Built, Not Given —

An engineer's life is not a straight road—it's a maze of ideas, errors, retries, and breakthroughs. It's less about what you know, and more about how many times you're willing to try again when things don't work.

Days don't always start with clarity. Sometimes they begin with confusion, half-written code, or a problem that refuses to make sense. But that's where the journey begins—turning uncertainty into understanding.

There's a quiet kind of pressure in this life. Deadlines tick in the background, expectations sit on your shoulders, and yet, you keep moving—step by step, line by line. Progress is rarely loud; often, it's just a small fix, a tiny improvement, a moment where something finally clicks.

Failures are not rare here—they're routine. But instead of stopping, they teach. Each mistake becomes a guide, each bug a lesson, each delay a push to think deeper.

What makes it special is not the tools or technologies, but the mindset. The ability to stay patient when nothing works, to stay curious when things get complex, and to keep building even when the path is unclear.

An engineer doesn't just create solutions—they reshape problems into possibilities.

And somewhere in that constant cycle of trying, failing, and improving, they don't just build systems—they build themselves.



**KAVISHKA G**  
**II-A**



# AI MODEL COMPRESSION TECHNIQUES

AI model compression techniques such as pruning and quantization play a crucial role in optimizing deep learning models. This article discusses their working mechanisms, benefits, and practical applications.

Deep learning models are often large and computationally expensive, making them difficult to deploy on devices with limited resources. Model compression techniques aim to reduce the size and complexity of these models while maintaining their performance.

Pruning is a technique that removes unnecessary weights and neurons from a neural network. During training, not all parameters contribute equally, so less important ones can be eliminated. This reduces the model size and improves efficiency.



Quantization involves reducing the precision of numerical values in the model. For example, converting 32-bit floating-point values to 8-bit integers significantly decreases memory usage and speeds up computations.

These techniques are widely used in mobile applications, IoT devices, and real-time systems. For instance, compressed models enable smartphones to run AI applications such as image recognition and voice assistants efficiently.

Despite their benefits, model compression techniques may lead to slight accuracy loss if not carefully implemented. Therefore, a balance between efficiency and performance is essential.

Model compression is essential for deploying AI in real-world environments, especially in resource-constrained systems. It enables faster, lighter, and more energy-efficient AI models.



# FLUX: A LANGUAGE FOR PROGRAMMING HIGH-PERFORMANCE SERVERS

Programming high-performance server applications is challenging: it is both complicated and error-prone to write the concurrent code required to deliver high performance and scalability. Server performance bottlenecks are difficult to identify and correct. Finally, it is difficult to predict server performance prior to deployment. This paper presents Flux, a language that dramatically simplifies the construction of scalable high-performance server applications. Flux lets programmers compose off-the-shelf, sequential C or C++ functions into concurrent servers. Flux programs are type-checked and guaranteed to be deadlock-free. We have built a number of servers in Flux, including a web server with PHP support, an image-rendering server, a BitTorrent peer, and a game server. These Flux servers match or exceed the performance of their counterparts written entirely in C. By tracking hot paths through a running server,

Flux simplifies the identification of performance bottlenecks. The Flux compiler also automatically generates discrete event simulators that accurately predict actual server performance under load and with different hardware resources.

To introduce Flux, we develop a sample application that exercises most of Flux's features. This sample application is an image server that receives HTTP requests for images that are stored in the PPM format and compresses them into JPEGs, using calls to an off-the-shelf JPEG library. Recently-compressed images are stored in a cache managed with a least-frequently used (LFU) replacement policy.

A single Flux program represents an unbounded number of separate concurrent flows: each request executes along a separate flow through the Flux program, and eventually outputs results back to the client.

The Flux language consists of a minimal set of features, including concrete nodes that correspond to the C or C++ code implementing the server logic, abstract nodes that represent a flow through multiple nodes, predicate types that implement conditional data flow, error handlers that deal with exceptional conditions, and atomicity constraints that control simultaneous access to shared state.



## EVALUATING LLMs FOR CODE GENERATION IN HRI

This study investigates the effectiveness of Large Language Models (LLMs) in generating code for Human-Robot Interaction (HRI) applications. We present the first direct comparison of ChatGPT 3.5, Gemini 1.5 Pro, and Claude 3.5 Sonnet in the specific context of generating code for Human-Robot Interaction applications. Through a series of 20 carefully designed prompts, ranging from simple movement commands to complex object manipulation scenarios, we evaluate the models' ability to generate accurate and context-aware code. The study highlights the rapid advancement in LLM capabilities for specialized programming tasks while also identifying persistent challenges in spatial reasoning and adherence to specific constraints. These results suggest promising applications for LLMs in robotics development and education while emphasizing the continued need for human oversight and specialized training in AI-assisted programming for HRI.

- (1) How accurately can current LLMs generate code for basic and complex robotic movement patterns based on natural language instructions?
- (2) To what extent do these models demonstrate understanding of spatial relationships and physical constraints in a three-dimensional environment?
- (3) How do the performance and capabilities of ChatGPT 3.5, Gemini 1.5 Pro, and Claude 3.5 Sonnet compare in the context of HRI code generation?
- (4) What are the current limitations and areas for improvement in using LLMs for robotic programming tasks? By addressing these questions, our study contributes to the growing body of research on AI-assisted programming in robotics .;

Crucially, this study addresses a significant gap in the current literature by providing the first direct comparison of ChatGPT 3.5, Gemini 1.5 Pro, and Claude 3.5 Sonnet in the specific context of robotics code generation. While previous studies have examined LLMs in general code generation tasks, our focus on these state-of-the-art models in the specialized domain of HRI programming represents a novel contribution to the field. Furthermore, while traditional software engineering often employs code complexity metrics to evaluate code quality, our study deliberately focuses on a pass/fail approach.

The rapid advancement of Large Language Models (LLMs) has opened new frontiers in various domains, including Human-Robot Interaction (HRI). As robots become increasingly integrated into human environments, from manufacturing floors to healthcare facilities and homes, the need for efficient and accurate programming of these systems becomes paramount. The potential of LLMs to generate code based on natural language inputs presents a promising avenue for streamlining the development process in HRI applications. However, the application of LLMs in generating code for robotic systems presents unique challenges. Unlike general-purpose programming tasks, code generation for HRI requires a nuanced understanding of spatial relationships, physical constraints, and the ability to translate abstract concepts into precise movement instructions.

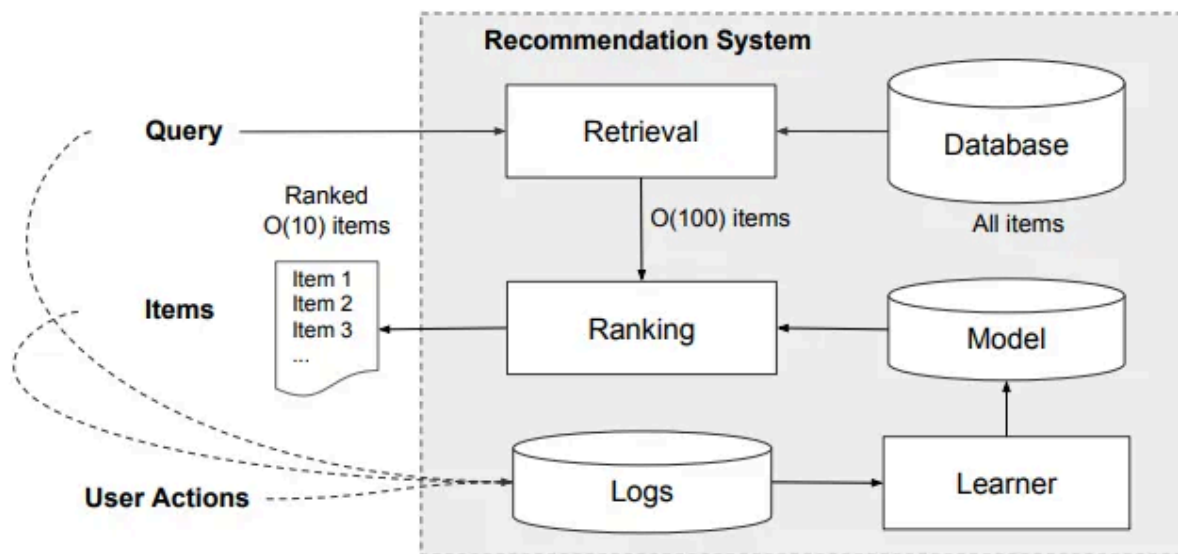
The complexity of these tasks raises questions about the current capabilities of LLMs in this specialized domain. This study aims to address a gap in the current literature by providing a comparative analysis of state-of-the-art LLMs in generating code for an abstract robot class. Specifically, we investigate the performance of ChatGPT 3.5, Gemini 1.5 Pro, and Claude 3.5 Sonnet in translating natural language instructions into functional Java code for robotic movement and object manipulation tasks. This approach also allows us to more clearly differentiate between the LLMs' abilities to generate code that accurately translates natural language instructions into executable robot commands. Moreover, this research provides insights into the broader question of how well LLMs can bridge the gap between natural language understanding and the generation of precise, executable instructions for physical systems. By comparing these specific LLMs, which represent different approaches and recent advancements in language model development, this comparison not only highlights the rapid progress in LLM technology but also identifies areas where further development is needed to fully realize the potential of AI-assisted programming in robotics.





# HOW RECOMMENDATION SYSTEMS PREDICT WHAT YOU WANT

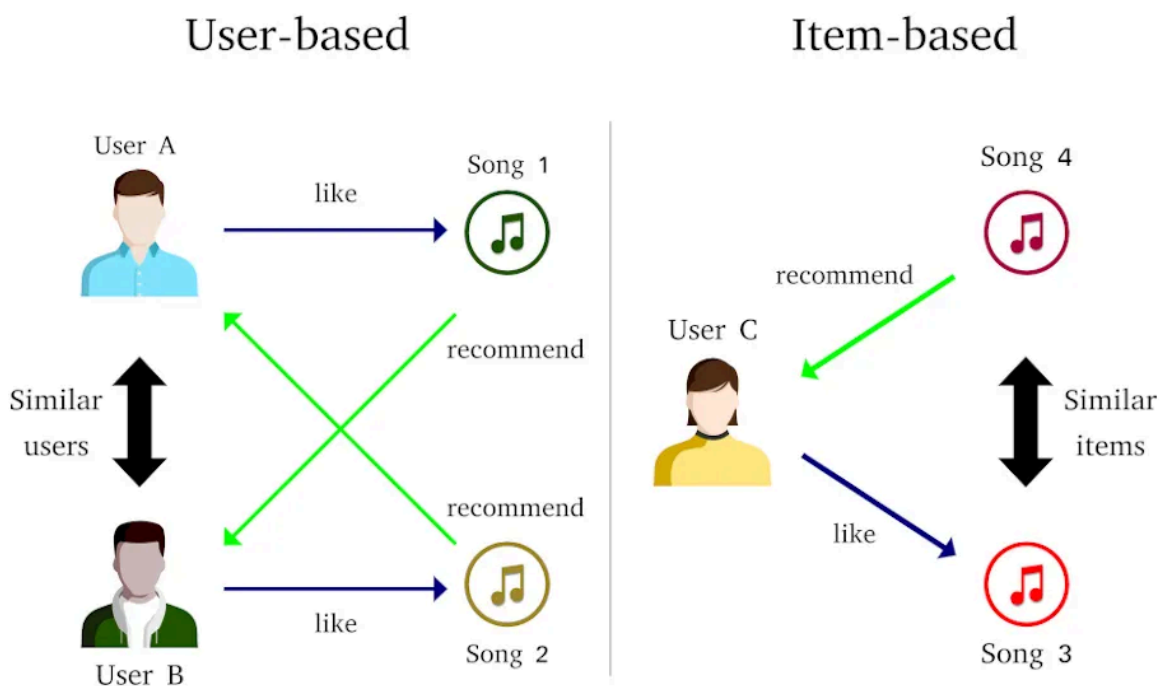
## THE CASE OF NETFLIX



Recommendation systems have become an essential part of modern digital platforms, helping users navigate through vast amounts of content by providing personalized suggestions. Netflix is one of the most advanced examples of this technology in action. Instead of randomly recommending movies or shows, Netflix follows a structured workflow that begins with data collection, where it tracks user behaviour such as watch history, viewing duration, search queries, and interactions like likes or skips. This data is then used to build a user profile that represents individual preferences, such as a user's interest in action or thriller content. At the same time, Netflix analyzes each movie or show by tagging it with attributes like genre, mood, language, and actors, allowing the system to clearly understand the content.

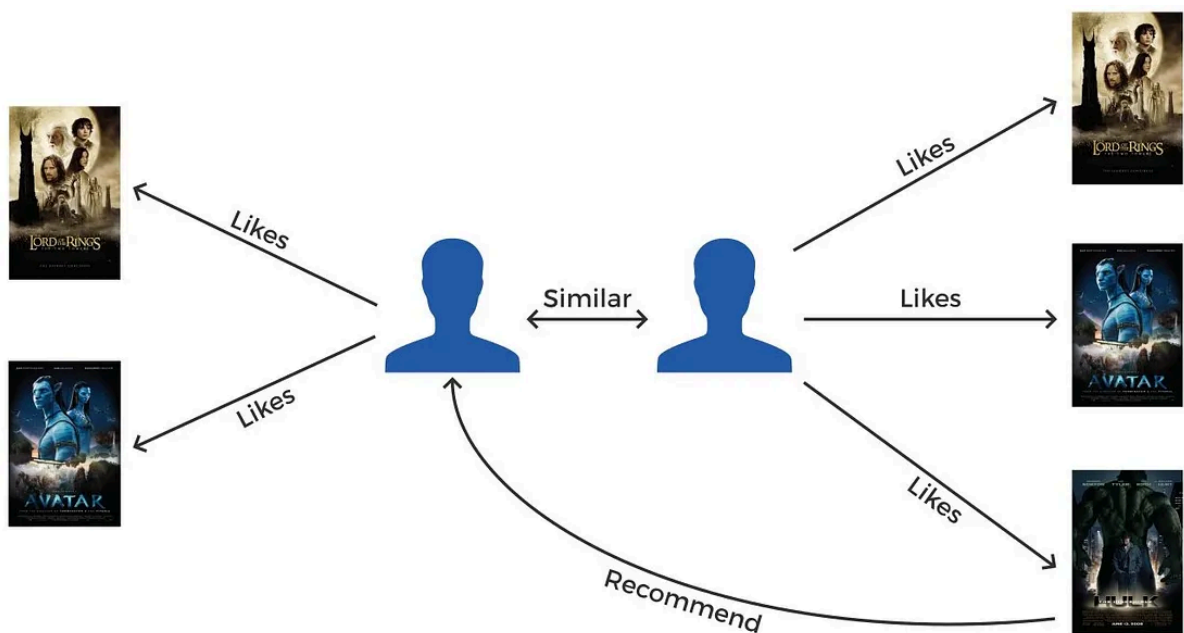
## USER-USER COLLABORATIVE FILTERING:

User–User Collaborative Filtering is a recommendation technique that focuses on finding users who have similar preferences and behaviour patterns. The system analyses user data such as ratings, watch history, or interactions, and calculates similarity between users based on common interests. Once similar users (often called “neighbours”) are identified, the system recommends items that those users have liked but the current user has not yet seen. For example, if two users have both watched and enjoyed similar action and thriller movies, and one of them has watched an additional movie like *Breaking Bad*, the system will recommend that movie to the other user. This method works well when there is sufficient user data, but it has limitations such as poor scalability when the number of users increases and difficulty in providing recommendations for new users who have little or no activity data, known as the cold start problem.









## ITEM-ITEM COLLABORATIVE FILTERING:

Item–Item Collaborative Filtering, on the other hand, focuses on finding similarities between items rather than users. Instead of comparing users, the system analyses how different items are related based on user interactions. If many users tend to like or watch two items together, those items are considered similar. When a user interacts with a particular item, the system recommends other items that are similar to it. For example, if a user watches Money Heist, and many other users who watched it also watched Narcos, the system will recommend Narcos. This approach is generally more efficient and scalable compared to user-based filtering because the number of items is usually more stable than the number of users. It is widely used in real-world systems like Netflix and Amazon, as it provides faster and more consistent recommendations, although it may sometimes be less personalized compared to user-based methods.



## Every Signal Matters

You might think Netflix only tracks what you watch. Not even close. It is much more detailed than that. Here are the hidden signals it collects about you:

<p> <b>How Long You Watched</b> 10 minutes vs finishing the whole thing — both tell Netflix something very different about how much you liked it.</p>	<p> <b>Rewinding &amp; Re-watching</b> If you rewind a scene multiple times, Netflix knows you loved it — or found it confusing. It figures out which.</p>
<p> <b>What Time You Watch</b> Watching at 11pm versus 9am signals different moods. Netflix adjusts its recommendations based on time of day.</p>	<p> <b>What You Searched</b> Even if you searched for something but never watched it — that search tells Netflix about your current interests.</p>
<p> <b>Thumbs Up / Down</b> Direct signals. Netflix weights these heavily because it is rare that someone actually bothers to rate something.</p>	<p> <b>Which Device You Use</b> Watching on mobile during your commute? Different recommendations than watching on your TV on a Saturday night.</p>

## THE BOTTOM LINE:

**Netflix does not recommend what is popular. It recommends what is popular for you. That difference is built from millions of tiny data points and algorithms trained on billions of hours of human watching behaviour. The next time Netflix feels like it read your mind it kind of did.**



# MATLAB IN CHEMISTRY

MATLAB is an useful tool for people who work in science and engineering including chemistry. It is easy to use. It helps with calculations and making sense of data. This is especially helpful for chemists who have to deal with a lot of information and complicated equations.

In chemistry people use MATLAB to look at the results of their experiments. They can use it to understand things like how fast reactions happen what spectroscopic readings mean and how thermodynamic values work. For example chemists can use MATLAB to make graphs that show how the amount of something changes over time. This helps them see how different conditions affect reactions.

MATLAB is also used to build models of molecules and to simulate chemical reactions. It has tools and libraries that make it easy to do this kind of work. This is really useful for people who work in areas like chemistry and drug discovery. They need to be able to predict how molecules will behave before they do experiments.

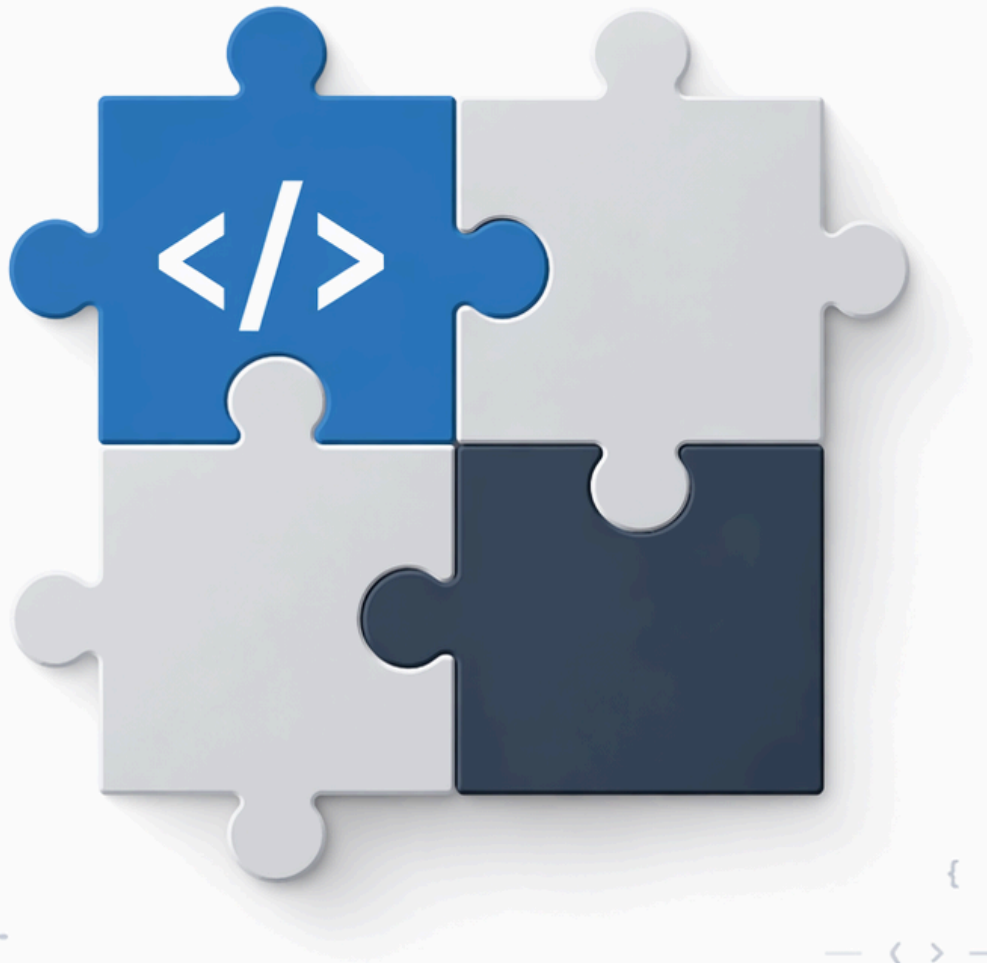
MATLAB is also helpful for people who work in chemistry and spectroscopy. It can be used to solve equations like the Schrödinger equation, which helps us understand the energy levels of atoms and molecules. In spectroscopy MATLAB is used to look at IR, NMR and UV-Visible spectra. This makes it easier to understand the results of experiments.

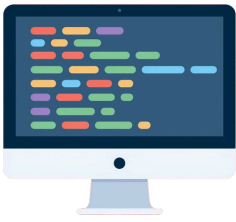
MATLAB can also be used to automate tasks that have to be done over and over. Researchers and chemical engineers can write scripts to do these tasks quickly and accurately. MATLAB can also connect to laboratory instruments and other programming tools, which makes it easier to do research.

In conclusion MATLAB is an important tool for people who work in chemistry. It helps with looking at data, building models and simulating chemical reactions. It makes it easier to understand math problems and it gives us a clear picture of what is happening in chemical reactions. Because it is so useful MATLAB is a skill that students, researchers and professionals, in chemistry should learn.



# CODING PUZZLES





# CODE PUZZLE

Think • Solve • Improve



## PUZZLE 1 — Goroutine + Channel

### CODE

```
package main
import "fmt"

func worker(ch chan string) {
    ch <- "Done"
}

func main() {
    ch := make(chan string)
    go worker(ch)
    fmt.Println(<-ch)
}
```

### ? QUESTION

What will be the output?

### 💡 HINT

- Main function waits for data from channel.
- Think: who sends data and when?

### 👉 YOUR ANSWER



## PUZZLE 2 — Mutex (Concurrency)

### CODE

```
package main
import (
    "fmt"
    "sync"
)
var count int
var mu sync.Mutex
func increment() {
    mu.Lock()
    count++
    mu.Unlock()
}
func main() {
    increment()
    fmt.Println(count)
}
```

### ? QUESTION

What will be the output?

### 💡 HINT

- Check how many times increment() is called.
- Mutex controls access, not repetition.

### 👉 YOUR ANSWER

## ✅ ANSWERS & EXPLANATION

✅ **Puzzle 1 Answer:** Done

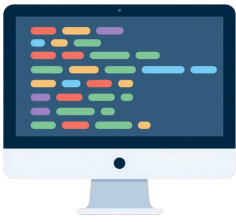
### Explanation:

The goroutine sends "Done" through the channel, and main waits using <-ch before printing.

✅ **Puzzle 2 Answer:** 1

### Explanation:

increment() runs only once. Mutex ensures safe update → count becomes 1..



# CODE PUZZLE

Think • Solve • Improve



## PUZZLE 1 —Value vs Reference

### CODE

```
using System;
class Program {
    static void Change(int x) {
        x = 100;
    }
    static void Main() {
        int a = 10;
        Change(a);
        Console.WriteLine(a);
    }
}
```

### ? QUESTION

Will 'a' change?

### 💡 HINT

Understand how values are passed to methods.

### 📝 YOUR ANSWER

---



## PUZZLE 2 —String Immutability

### CODE

```
using System;

class Program {
    static void Main() {
        string s1 = "Hello";
        string s2 = s1;
        s2 += " World";
        Console.WriteLine(s1);
        Console.WriteLine(s2);
    }
}
```

### ? QUESTION

Same or different output?

### 💡 HINT

Strings are immutable. Modifications create a new object.

### 📝 YOUR ANSWER

---

## ✅ ANSWERS & EXPLANATION

✅ **Puzzle 1 Answer:** 10

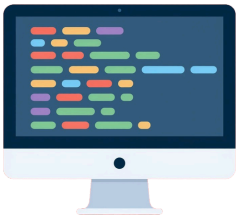
### Explanation:

Integer is passed by value → original variable is unchanged..

✅ **Puzzle 2 Answer:** Hello ,Hello World

### Explanation:

Strings are immutable → s2 creates a new string.



# CODE PUZZLE

Think • Solve • Improve



## PUZZLE 1 —Boxing / Unboxing

### CODE

```
using System;
class Program {
    static void Main() {
        int a = 10;
        object obj = a;
        obj = 20;
        Console.WriteLine(a);
        Console.WriteLine(obj);
    }
}
```

### ? QUESTION

Does 'a' change?

### 💡 HINT

Boxing creates a separate copy of the value.

### ✍️ YOUR ANSWER

---



## PUZZLE 2 —Range Variable Trap

### CODE

```
package main
import "fmt"

func main() {
    nums := []int{1, 2, 3}
    for _, v := range nums {
        go func() {
            fmt.Println(v)
        }()
    }
}
```

### ? QUESTION

What will be printed?

### 💡 HINT

- The loop variable 'v' is reused in each iteration.
- Goroutines may execute after the loop ends.

### ✍️ YOUR ANSWER

---

## ✅ ANSWERS & EXPLANATION

✅ **Puzzle 1 Answer:** 10, 20

### Explanation:

Boxing copies value → changing obj does not affect 'a'.

✅ **Puzzle 2 Answer:** 3 3 3

### Explanation:

All goroutines capture the same variable 'v'. By the time they execute, the loop has finished, so 'v' holds the last value (3).

# Logical Puzzles

---



# RIDDLES IN CODE



Think • Solve • check

---

## RIDDLE 01

I exist in every program,  
Sometimes I help, sometimes I break things,  
Developers fear me but also chase me.

**Answer:** \_\_\_\_\_

## RIDDLE 02

The more of me you have, the slower things  
become.  
Yet without me, multitasking is impossible.

**Answer:** \_\_\_\_\_

## RIDDLE 03

I travel across networks in small pieces,  
Reassemble at the destination,  
But if I'm lost, communication fails.

**Answer:** \_\_\_\_\_

## RIDDLE 04

I translate human ideas into machine  
instructions,  
Without me, code cannot run.

**Answer:** \_\_\_\_\_

## RIDDLE 05

I am not physical, yet I can crash systems,  
Overflow me, and everything stops working.

**Answer:** \_\_\_\_\_

## RIDDLE 06

I make copies of myself to spread,  
Sometimes harmless, sometimes harmful.

**Answer:** \_\_\_\_\_

## RIDDLE 07

I organize data for fast searching,  
Like a tree but upside down.

**Answer:** \_\_\_\_\_

## RIDDLE 08

I ensure only one process accesses a  
resource at a time,  
Without me, chaos occurs.

**Answer:** \_\_\_\_\_

## RIDDLE 09

I hide data inside data,  
Used for security and secrecy.

**Answer:** \_\_\_\_\_

## RIDDLE 10

I look like a list but allow fast insertions and  
deletions,  
I connect elements using pointers.

**Answer:** \_\_\_\_\_

## RIDDLE 11

I remember things temporarily,  
Lose everything when power is gone.

**Answer:** \_\_\_\_\_

## RIDDLE 12

I reduce repeated work by storing results,  
Making programs faster over time.

**Answer:** \_\_\_\_\_

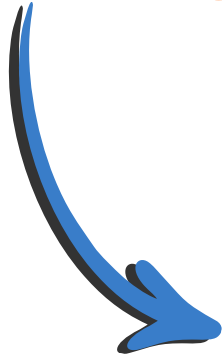


MONIKA R  
I-A





# LOGICAL CHALLENGE



1

## NUMBER PATTERN

If:

$$1 = 5$$

$$2 = 10$$

$$3 = 15$$

$$4 = 20$$

What is  $5 = ?$

Answer: \_\_\_\_\_

2

## ALPHABET LOGIC

If:

$$\text{CAT} = 24$$

$$\text{DOG} = 26$$

What is  $\text{BAT} = ?$   
(Hint: Alphabet position)

Answer: \_\_\_\_\_

3

## NUMBER RIDDLE

$$1 = 3$$

$$2 = 3$$

$$3 = 5$$

$$4 = 4$$

$$5 = 4$$

What is  $6 = ?$

Answer: \_\_\_\_\_

4

## MAGIC SQUARE

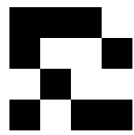
Fill numbers 1–9 so every row, column, and diagonal = 15

[ ]	[ ]	[ ]
[ ]	5	[ ]
[ ]	[ ]	[ ]

Answer: (Fill the grid above)



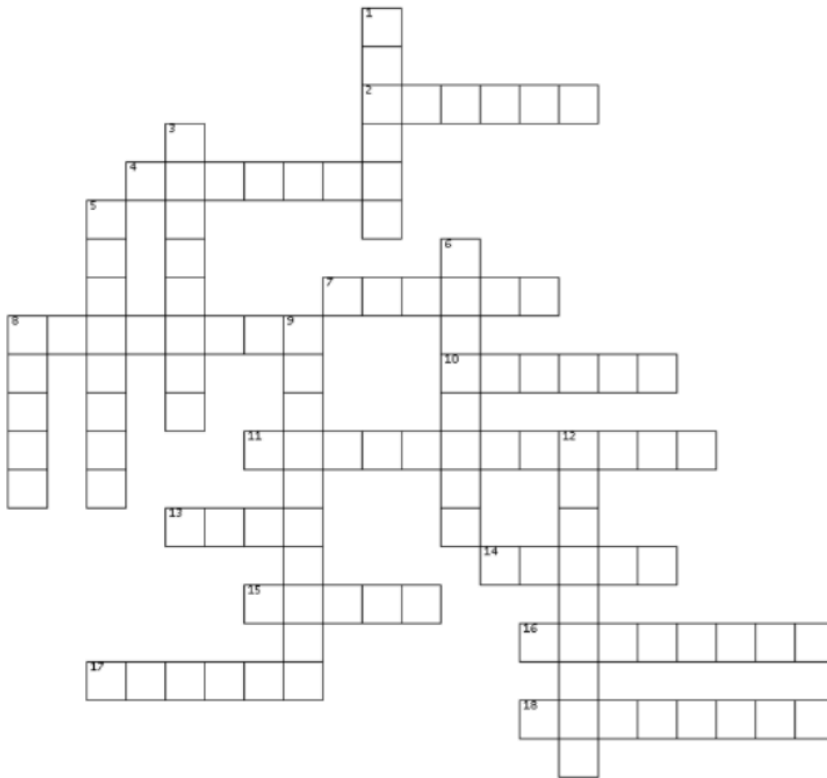
MADHUMITHA P  
I-A



# CYBER MYSTERY

## CROSSWORD

### PUZZLE GRID



### CLUES

#### ACROSS →

2. Computer that requests services
4. Harmful software that damages systems
7. Language of 0s and 1s
8. Organized collection of data
10. Provides services to other computers
11. Study of secure communication
13. Repeats a set of instructions
14. Stores data on the internet
15. Self-replicating harmful program
16. Protects a network from unauthorized access
17. Popular programming language
18. Fake attempt to steal user information

#### ↓ DOWN

1. Person who secretly breaks into systems
3. Stores data values in programming
5. Rules for data communication
6. Secret key used to access accounts
8. Remove errors from a program
9. Converts data into secret code
12. Step-by-step problem solving method

 **Tip: Cyber security puzzles train your logical thinking.**





# LOGICAL PUZZLES – ANSWERS

1

## RIDDLES – ANSWERS

- 01 → Bug
- 02 → Threads / Processes
- 03 → Data Packets
- 04 → Compiler / Interpreter
- 05 → Stack
- 06 → Computer Virus
- 07 → Binary Search Tree
- 08 → Mutex / Lock
- 09 → Encryption
- 10 → Linked List
- 11 → RAM
- 12 → Caching / Memoization

2

## LOGICAL PUZZLES – ANSWERS

### 1) NUMBER PATTERN

Answer: 1

(Trick: 1 = 5 already given → so 5 = 1)

### 2) ALPHABET LOGIC

$B(2) + A(1) + T(20) = 23$

Answer: 23

### 3) NUMBER RIDDLE

One(3), Two(3), Three(5), Four(4), Five(4), Six(3)

Answer: 3

### 4) MAGIC SQUARE

[ 8 ] [ 1 ] [ 6 ]

[ 3 ] [ 5 ] [ 7 ]

[ 4 ] [ 9 ] [ 2 ]

3

## CROSSWORD – ANSWERS



### ACROSS

- 2. CLIENT
- 4. MALWARE
- 7. BINARY
- 8. DATABASE
- 10. SERVER
- 11. CRYPTOGRAPHY
- 13. LOOP
- 14. CLOUD
- 15. VIRUS
- 16. FIREWALL
- 17. PYTHON
- 18. PHISHING



### DOWN

- 1. HACKER
- 3. VULNERABILITY
- 5. PROTOCOL
- 6. PASSWORD
- 8. DEBUG
- 9. ENCRYPTION
- 12. ALGORITHM



### How many did you solve?

- 0-5 😊
- 6-10 👍
- 11-15 💪
- 16+ 🏆



### Your Performance

- Beginner 😊
- Intermediate 😊
- Advanced 💪
- Expert 🏆



Tip: Understanding logic is better than memorizing answers.

# PROJECT SPHERE

IDEAS • INNOVATION • IMPACT



IDEATE



DESIGN



DEVELOP



ANALYZE



DELIVER





## **Deep Learning-Based Automated Egg Quality Inspection Using EfficientNet-B4 and Grad CAM**

This project proposes an automated system to identify fresh and cracked eggs using image-based deep learning with EfficientNet-B4, addressing the poultry industry's challenge of economic loss from cracked eggs. Grad-CAM visualizes decision-influencing regions, enhancing transparency and reliability. The cost-effective system processes large volumes quickly, reducing manual workload and inconsistency. It offers a practical solution for poultry farms to improve egg quality inspection and customer satisfaction.

Abishek A, Gobinath G – IV IT A

## **Smart Digital Application for Gram Panchayat-Driven Rural Water Supply Management**

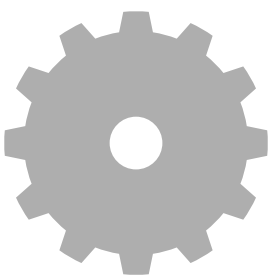
This project develops a low-cost web app for Gram Panchayats and VWSCs to manage rural piped water systems, addressing issues like leaks and poor quality. It enables tracking of pump operations, water flow, and manual quality testing (pH, chlorine), plus a public complaint portal for citizens to report issues. Officials act via a dashboard, ensuring transparency and efficient maintenance. The system supports long-term data storage and real-time decision-making, empowering rural communities for sustainable and accountable water management.

Aakash K, Gowshika M – IV IT A

## **Centralized digital framework for monitoring and supporting student mental wellness in higher education**

The rising prevalence of student mental health challenges calls for a proactive, centralized digital framework beyond reactive counselling systems. This AI-powered ecosystem integrates anonymized assessments, risk prediction, personalized resources, and structured communication among students, faculty, and counsellors. It enables early identification of at-risk students, reduces stigma, and improves institutional responsiveness. Early results show better detection accuracy, faster response times, and higher engagement. The model supports SDG 3 and SDG 4, offering a scalable solution for digital higher education.

Abishek S, Gobiha J S – IV IT A





## **Holistic PCOS wellness tracker with chatbot support and diet chart**

PCOS, a common hormonal disorder, is often managed reactively with limited personalization. This project presents an AI-powered digital framework integrating risk prediction (Normal, Moderate, High), a chatbot for self-assessment, and dynamic diet/exercise charts. Leveraging machine learning and NLP, it enables early detection, personalized lifestyle management, and user-friendly visualization. The holistic tracker empowers women with sustainable wellness support, aligning with SDG 3 and SDG 5.

Aishwarya S S, Kavipriyanga S U – IV IT A

## **AI-Driven Urban Waste Reporting and Tracking Platform Using Deep Learning**

This project presents an AI-driven urban waste reporting and tracking platform using YOLOv8 to classify waste from citizen-submitted images, text, or voice inputs. Geolocation-based routing assigns validated reports to the nearest collection units, while a central dashboard offers real-time insights for municipal authorities. A reward system boosts citizen engagement and accountability. Experimental results show high accuracy, faster response times, and improved task allocation, supporting SDG 11 and SDG 12 for cleaner, smarter cities.

Ajith R, Fizur Rahman S – IV IT A

## **Game-Driven Learning Platform for Sustainable Agriculture**

This gamified platform teaches farmers sustainable practices through tree selection (e.g., mango, banana), video tutorials, interactive quizzes, and a mini farm simulation with real-time feedback on crop health and yield. It rewards progress with points, badges, and levels, while AI personalizes learning by analyzing user activities. Tested with user feedback, the platform is deployed as a web or mobile app for easy access. It transforms traditional farming education into an engaging, hands-on experience promoting sustainability.

Akalya N, Akshaya K P – IV IT A



## **AI -Driven Malware Detection and Prevention Framework for Mobile Security**

Rising mobile app usage increases exposure to advanced cyber threats like ransomware and zero-day attacks, which traditional signature-based antivirus fails to counter. This AI-driven framework integrates machine learning, NLP, and role-based classification for hybrid static and behavioral malware detection. Implemented as a lightweight Android solution, it provides real-time alerts, quarantine, and interpretable analytics with minimal resource use. Experimental results show improved detection precision and adaptability to emerging threats. The system supports SDG 9, 11, and 16 for a scalable, privacy-conscious mobile security ecosystem.

Akchayaa V P, Lakma Varshini R – IV IT A

## **Gamified Code Clash Platform for C Language**

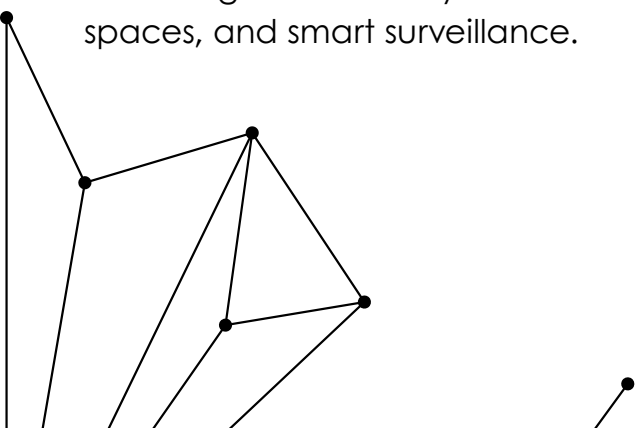
Traditional C programming education relying on theory and manual assessments often fails to engage students or provide timely feedback. This project proposes a gamified learning platform with real-time coding challenges, automated evaluation, instant feedback, and a competitive multiplayer environment. Using Docker-based sandboxing for secure execution, it features leaderboards, scoring, progress tracking, and instructor analytics. Initial results show improved motivation, faster skill development, and enhanced problem-solving. The platform bridges theory and practice, supporting self-paced learning and computational thinking.

Angammal R, Divya P – IV IT A

## **Deepvision Automated Video Analysis for Security Operations**

DeepVision is an AI-based real-time surveillance system that detects intrusions and weapon threats using deep learning. It addresses manual monitoring inefficiencies by combining YOLOv8-based object detection (persons, guns, knives, pistols, rifles) with an ensemble approach and tracking module. An intrusion detection engine triggers Telegram alerts when a weapon is identified, with OpenCV visualizing results via bounding boxes. The system offers high-efficiency, scalable security for campuses, public spaces, and smart surveillance.

Anisa F, Gowthami Sri D M – IV IT A





## **An Agentic AI Framework for Strengthening Preventive Healthcare**

This project presents an Agentic AI Framework for Preventive Dental Healthcare using Gemini-based agents to automate smart scheduling, no-show prediction, reminders, billing, and resource management. It ensures interoperability via FHIR and ABDM standards for seamless data exchange. Real-time analytics dashboards empower dental professionals with proactive, personalized, and data-driven preventive care. Early results show improved appointment efficiency, patient compliance, and clinical resource utilization, addressing gaps in traditional dental management.

Arul G, Balasastha E – IV IT A

## **AI-Based Multi Modal Data Organizer**

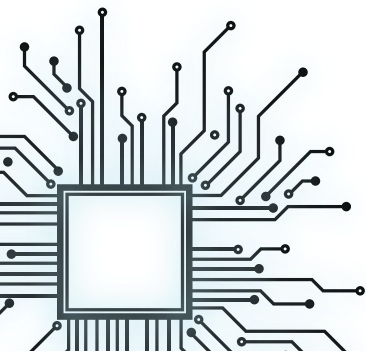
This project presents a local, privacy-focused personal information management system using Ollama-hosted multimodal AI (gemma4:e4b for image/text understanding and tagging, nomic-embed-text for embeddings) with ChromaDB and SQLite. A Flutter frontend communicates with a Python FastAPI sidecar for features like automatic tagging, semantic folder organization, natural language chat search, and offline hyperlink scraping. Evaluation shows accurate semantic retrieval, fast local inference, and an intuitive no-tech user experience, overcoming cloud reliance and privacy concerns of traditional tools.

Boopesh L, Kavin Kumar A – IV IT A

## **Framework for Civic Issue Resolution in Smart City Complaint Systems**

Rapid urbanization in developing economies strains municipal infrastructure, with traditional citizen complaint systems causing delays and lack of accountability. This integrated mobile application, designed for 2–3 municipal employees and citizens, enables reporting, managing, and tracking civic issues like potholes, broken streetlights, and flooding. Its dynamic geospatial alert module and automated work assignment system use location-based intelligence for real-time tracking. The Smart City Complaints framework enhances transparency, accountability, and responsiveness, keeping citizens informed throughout the process.

Chandru P, Dhinakaran T – IV IT A



## **Smart Alumni–Student Community Platform Using Rag**

Traditional student-alumni platforms rely on static profiles and keyword search, lacking personalization and real-time engagement. This project proposes a centralized connectivity platform using Retrieval-Augmented Generation (RAG) with vector search and LLMs for dynamic, context-aware mentorship and career support. It enables intelligent query processing, personalized recommendations, and secure data handling. Results show improved search accuracy, user engagement, and reduced administrative effort, bridging academic learning with industry exposure sustainably.

Deva Prasath P S, Dhanush Shankar U – IV IT A

## **Behavioral Fingerprint Analysis for Insider Threat Detection**

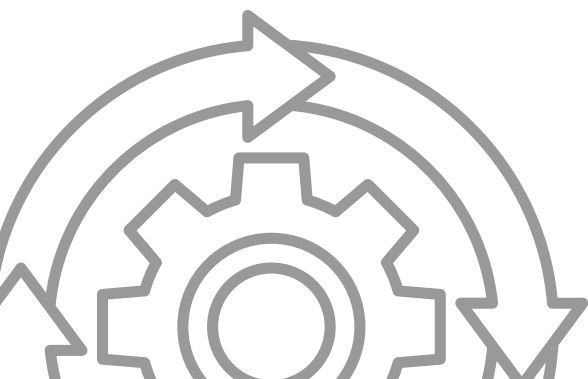
This paper presents an AI/ML-based insider threat detection system that identifies risks from authorized users by analyzing behavior, system interactions, and access records. Unlike perimeter-based security, it creates dynamic user profiles and uses intelligent classification to detect anomalies with low false positives. The system integrates automated alerts and report generation for security administrators. This software-based approach offers proactive, scalable, and cost-effective protection of organizational resources against insider cyberattacks.

Devika D, Dharshana K S – IV IT A

## **Integrating LSTM Forecasting with NLP Chatbots for Fair Agricultural Markets**

Vegetable price volatility in local markets leads to unfair pricing, intermediary exploitation, and supply imbalances. This AI-enabled platform uses LSTM models to forecast short-term prices based on historical patterns, demand-supply, seasonality, and environmental factors. An NLP-powered chatbot provides real-time insights on pricing trends, availability, and storage. With three layers (data, application, presentation), the system supports multilingual access, improves farmer income planning, and ensures stable consumer pricing, promoting fair trade and economic resilience.

Dhanush R, Jijendhar G – IV IT A





## **Real-Time Cyber Incident Feed System for Defending Against Threats**

Rising cyber threats to India's Critical Information Infrastructure demand a shift from periodic assessments to continuous real-time monitoring. This project proposes a centralized real-time cyber incident feed for Indian cyberspace, aggregating and normalizing threat data from global reports, dark web monitoring, and local honeypots. Using ML and NLP, it filters noise to deliver high-fidelity Indicators of Compromise aligned with NCIIPC and CERT-In mandates. Preliminary simulations show improved detection of regional threats over generic global feeds. This supports a resilient, self-reliant national cyber defense ecosystem.

Dhivya D, Dineshkumar C – IV IT A

## **A-powered smart crop advisory system for small and marginal farmers**

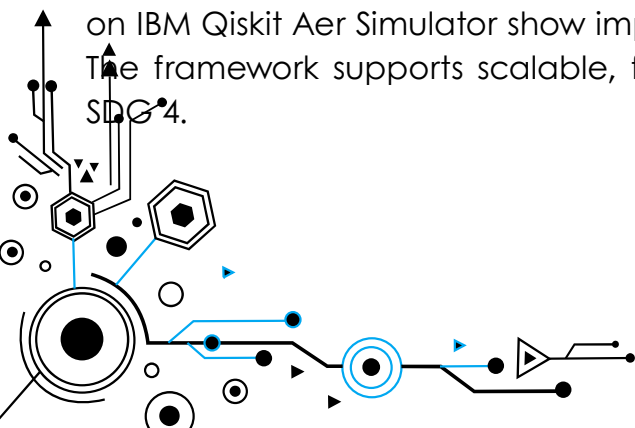
This project presents a CNN-based approach using TensorFlow and Keras to classify diseases in bell pepper, tomato, and potato plants, trained on healthy and bacterial spot-infected images with preprocessing and augmentation. The model uses convolutional and dense layers, evaluated by accuracy and loss. It supports real-time detection via uploaded or captured images, providing text and audio treatment recommendations. Deployed with Streamlit, the system helps farmers and researchers make timely crop management decisions for improved yield and sustainability.

Gokulakrishnan G, Kesavan V – IV IT A

## **Adaptive Quantum Error Mitigation Using Machine Learning in Noisy Intermediate-Scale Quantum Systems**

Quantum computing's progress is limited by hardware noise and gate errors, as traditional error correction requires excessive qubit redundancy unsuitable for NISQ devices. This project proposes a machine learning-driven framework using CNNs and RNNs for real-time error mitigation, dynamically adapting to hardware noise without extra qubits. Evaluations on IBM Qiskit Aer Simulator show improved accuracy, reliability, and faster correction cycles. The framework supports scalable, fault-tolerant quantum systems aligned with SDG 9 and SDG 4.

Haribaskar R, Jefin Rojar J – IV IT A



# SHARP TANK

STUDENT STARTUP SHOWCASE





1

**TYDRON** is a compact robotic solution designed to automatically collect metal scrap from industrial floors. It improves safety, reduces manual effort, and ensures efficient cleaning using an integrated brush and magnetic system.



**Madhan Raj M**  
III-A

**AQUASENTINEL** is an IoT-based smart water monitoring system that checks water quality in real time, sends safety alerts, predicts health risks, and tracks maintenance schedules to ensure safe drinking water and prevent waterborne diseases efficiently.

2



**DHANUSHRI R**  
II-A



A food delivery platform offering affordable, hygienic meals through both on-demand ordering and subscription plans. Designed for students and working professionals, it ensures timely delivery, easy ordering, and consistent quality using a scalable, user-friendly system with real-time tracking and efficient vendor management.

3



**Renu K T**  
IV-B

4


**Hadescore Technologies** is an emerging platform offering innovative cybersecurity, ethical hacking, and full-stack web development solutions. Focusing on digital security and modern technology, it aims to empower businesses and individuals with reliable, scalable, and intelligent tech services for a safer and smarter digital future.



**AKSHAYAA K P**  
IV-A

# INDIA'S HIDDEN INVENTORS


01

 **CLUE** Every time you sip filtered water or use a purified water source, this invisible shield stands between you and waterborne disease.

**Dr. Astha Jain Water Purification Membrane Technology (2009)**

**STORY** Working at IIT Delhi, Dr. Jain developed low-cost polymer nano-membranes that filter bacteria and heavy metals from contaminated water. Her membranes are now used in affordable household filters across rural India, replacing costly RO units.

02

 **CLUE** That ₹10 sachet of shampoo or medicine you buy at a local shop? A brilliant mind figured out how to make it last longer without refrigeration.



**Dr. Gagandeep Kang Oral Vaccine Thermostability Innovation (2000s)**



**STORY** India's first woman Fellow of the Royal Society, Dr. Kang pioneered rotavirus vaccine formulations stable at room temperature. Her work made vaccines deliverable to remote areas without cold chains, protecting millions of children from fatal diarrhea.




03

 **CLUE** The moment your phone GPS locks your location in seconds a woman's algorithm is quietly doing the heavy lifting behind the satellites.

**Dr. Nandini Harinath ISRO's Mars Orbiter Mission Navigation Software (2014)**

**STORY** As Deputy Operations Director for Mangalyaan, Dr. Harinath developed the precise trajectory software that guided India's spacecraft to Mars. The same orbital mechanics algorithms she perfected now underpin GPS accuracy used in every smartphone.

04

 **CLUE** You press a small tablet out of a blister pack every morning. The coating that protects it from moisture and makes it dissolve at exactly the right place in your body that was engineered.

**Dr. Usha Mutin Pharmaceutical Drug Coating Technology (1990s)**

**STORY** A pioneer at Lupin Laboratories, Dr. Mutin developed polymer-based enteric coatings that protect tablets through stomach acid, releasing the drug only in the intestine. Her formulations are used in widely prescribed antibiotics and painkillers sold across South Asia.

05




 **CLUE** When a doctor reads your blood report within hours instead of days, a rapid diagnostic tool made that speed possible.









**Dr. Soumya Swaminathan Rapid TB Diagnostic Protocols (2000s)**









**STORY** Former WHO Chief Scientist and Director-General of ICMR, Dr. Swaminathan developed standardised rapid sputum testing protocols for tuberculosis. Her methods reduced TB diagnosis time from weeks to under 24 hours and became the model adopted by national health programmes across 30+ countries.

<b>06</b>	<p> <b>CLUE</b> <i>The humble cotton bandage on your wound that does not stick to the healing skin its non-adherent weave was no accident.</i></p>
	<p><b>Dr. Manjari Singh Non-Woven Wound Dressing Fabric (2003)</b></p>
	<p><b>STORY</b> Researcher at NITRA (National Institute of Technology for Research in Apparel), Dr. Singh engineered a hydrophilic non-woven textile using treated cotton fibres that absorbs exudate without bonding to tissue. Her material is used in Government hospital dressings distributed under the Jan Aushadhi scheme.</p>

<b>07</b>	<p> <b>CLUE</b> <i>That tiny chip inside your metro card, office ID, or even your pet's tracker it talks without touching anything.</i></p>
	<p><b>Dr. Shanti Swarup Bhatnagar Awardee Sujata Bhatt - RFID Antenna Miniaturisation (2010)</b></p>
	<p><b>STORY</b> Working at SAMEER (Society for Applied Microwave Electronics Engineering &amp; Research), Dr. Bhatt miniaturised RFID antenna designs to fit inside thin cards while maintaining read range. Her antenna geometry is deployed in the DMRC metro smart cards used by over 3 million daily commuters.</p>

<b>08</b>	<p> <b>CLUE</b> <i>Every time an app on your phone works offline and syncs later without you noticing, a woman from Pune helped define how that works.</i></p>
	<p><b>Dr. Sunita Sarawagi Data Cleaning &amp; Information Extraction Algorithms (late 1990s–2000s)</b></p>
	<p><b>STORY</b> Professor at IIT Bombay, Dr. Sarawagi's CRF-based information extraction techniques form the backbone of how apps parse and clean unstructured text data. Her open-source iEx toolkit is embedded in enterprise software used by banks and telecom companies to process millions of documents daily.</p>

<b>09</b>	<p> <b>CLUE</b> <i>The sticker on an organic vegetable or a freshness label on packaged dal it contains more intelligence than it looks.</i></p>
	<p><b>Dr. Rachna Srivastava Smart Biodegradable Food Packaging Sensor (2015)</b></p>
	<p><b>STORY</b> At CSIR-CFTRI (Central Food Technological Research Institute), Dr. Srivastava developed edible indicator films made from turmeric and starch that change colour when food begins to spoil. Pilot batches were tested with Amul and local dairy cooperatives as an eco-friendly freshness indicator.</p>

<b>10</b>	<p> <b>CLUE</b> <i>That fibre-optic cable buried under your street bringing you high-speed internet the glass inside it was drawn using a process refined right here in India.</i></p>
	<p><b>Dr. Vijayalakshmi Ravindran Optical Fibre Preform Manufacturing Process (1988)</b></p>
	<p><b>STORY</b> Senior scientist at CSIR-CGCRI (Central Glass &amp; Ceramic Research Institute), Dr. Ravindran optimised the MCVD (Modified Chemical Vapour Deposition) process for fabricating low-loss optical fibre preforms indigenously. Her process slashed import costs and enabled BSNL's early fibre network rollout across India.</p>



# MEMES



**Me at 2pm:** Let me just mass delete these files  
**The files at 3am:**

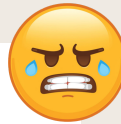


@techguruhumor



Abdul  
@codingmemes

...



TL: Can you estimate how long this will take?  
Developer: Between 2 hours and 6 months.



Abdul  
@codingmemes



Client: Can you make it faster?  
Developer: Sure. Should I remove the loading or the functionality?



Abdul  
@codingmemes



..

Client: Can you build this simple feature by today?  
Developer: Yes. Which today? .



Abdul  
@codingmemes

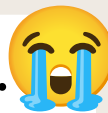
...

Manager: Why is the website down?  
Developer: It's not down... it's exploring new possibilities.



Abdul  
@codingmemes

...



Interviewer: How do you handle pressure?  
Developer: I rename the file to final\_v2\_last\_REAL\_final.js

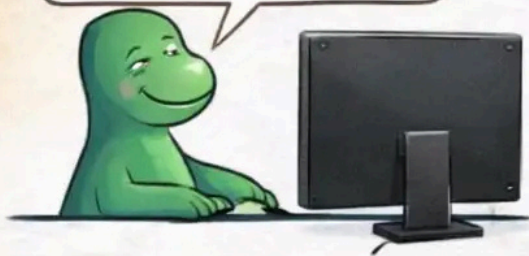


Abdul Kalam U  
III-A

# Evolution of IT Student to Placement Beast in one picture

## First Year

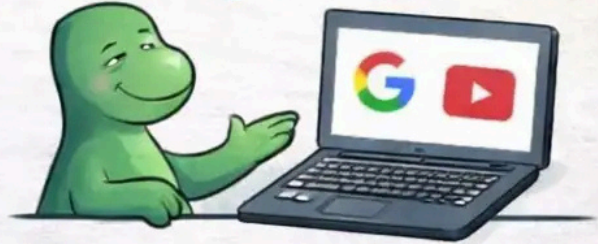
`print("Hello World")`



Hello! WRM print  
panna kathukuren 😊

## Second Year

Google YouTube



Google + YouTube dhan  
enoda best friend 🤝

## Third Year

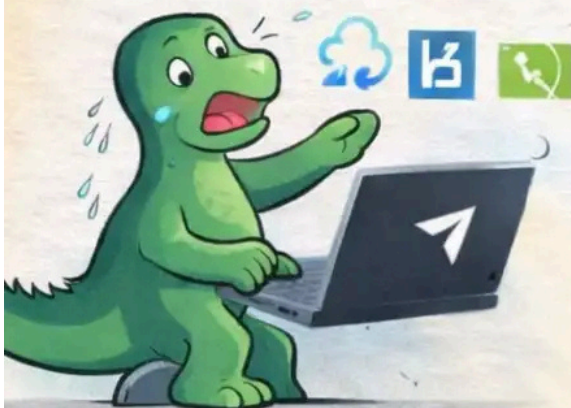


GitHub la copy paste  
pannitu debug panren 😓



Before Placement  
DSA, Aptitude, Coding...  
life ah sacrifice panren 🤖

## After Placement



Finally...  
Package secured



---

Literature  
Pearls

---





## பள்ளி வாழ்க்கை

பள்ளி வாசல், அதே மணம், அதே உணர்வு  
காலங்கள் ஓடினாலும்...

பள்ளியின் உள்ளே எண்ணம் தேடியது

தன் மழலை மாறாத மனதை

பள்ளி நண்பர்களின் சிரிப்பில்

சட்டென்று கரைந்தது

இத்தனை கால இடைவெளி

நண்பர்களுடன் ஆடிய மைதானமும்

ஓடி திரிந்த கால்களும்

கவிதையாய் நெஞ்சில் நிற்கின்றன

புத்தக அட்டையில் காற்றுக்காக வீசி

மகிழ்ந்த சுகம்- அந்த சொர்க்கம்

இன்று ஏசி அறையின் காற்றில் -இல்லை

இருப்பதெல்லாம் பழைய நினைவுகளில் ஏக்கம்

பள்ளி காலம் ஒவ்வொரு நிமிடமும் கற்றுத்தந்தது பாடம்;

இப்போது கூட நினைவுகள் விழித்துப் பார்க்கும் பொழுது

கண்கள் வேர்க்கத்தான் செய்கின்றன...

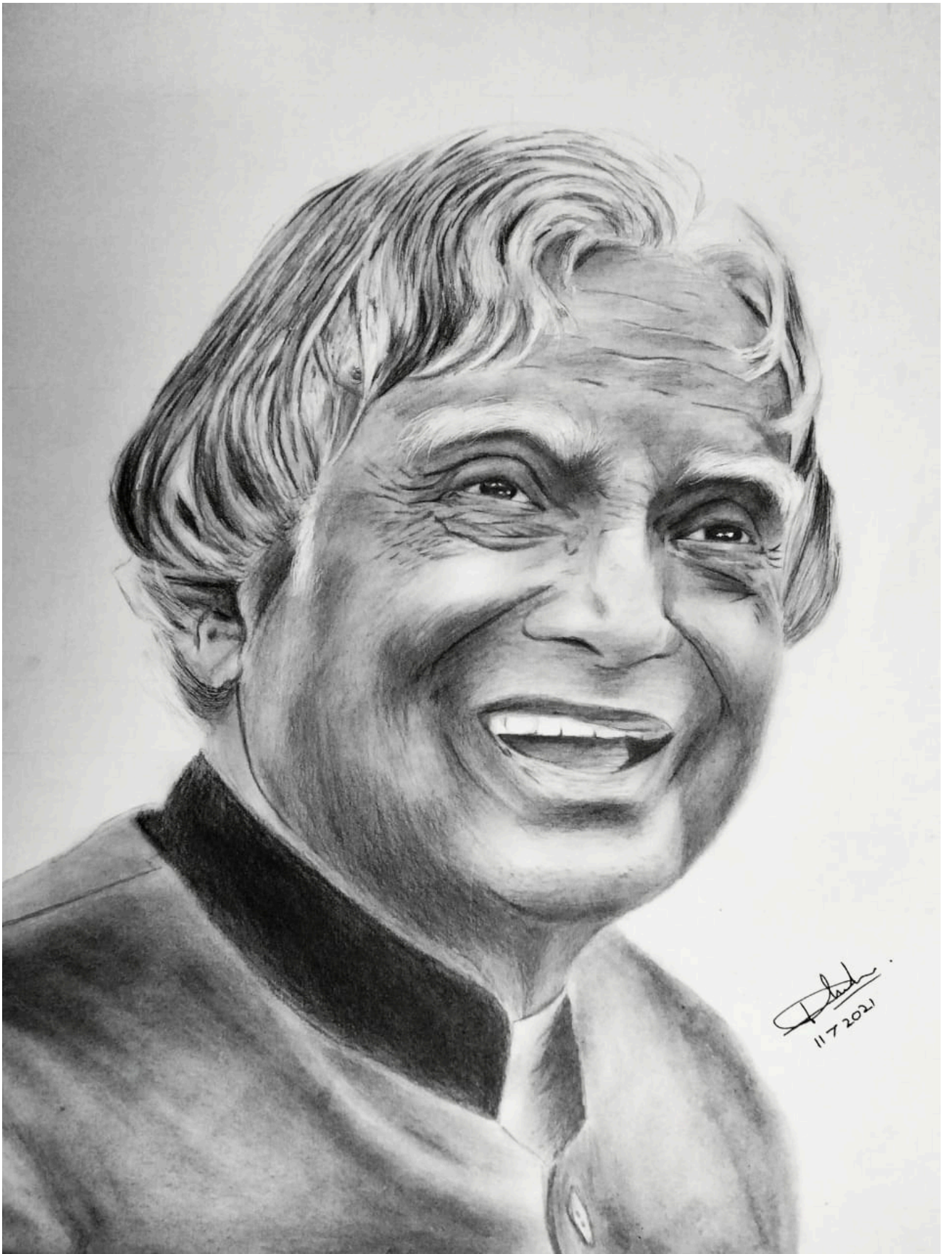


# நேற்று மெதுவாக, இன்று மின்னலாக

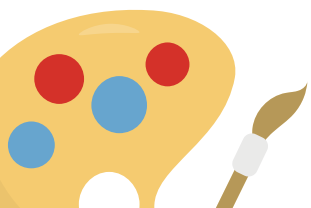


மண்வாசம் வீசிய நொண்டி அடித்து ஆடிய  
தெருக்கள் - அன்று!  
மின்சாரத் திரையில் விரல்கள் மேயும் சிறகுகள்  
கூண்டு - இன்று!  
மஞ்சள் கயிற்றில் கட்டிய ஓலை,  
மின்சாரக் கம்பியில் பாயும் வேலை!  
அரிக் கேன் விளக்கில் தேடிய பாடம்,  
அறிதிறன் பேசியில் அகிலமே ஆடும்!  
ஓலையில் தொடங்கிய எழுத்து வரி,  
இன்று மேகக் கணினியில் மின்னல் வரி!  
அன்று புறாக்கள் சுமந்த தூது மடல்,  
இன்று விரல் நுனியில் உலகக் கடல்!  
கால்நடைப் பயணம் காத தூரம்,  
விண்ணூர்தி கடக்கும் மேக ஓரம்!  
அஞ்சல்காரர் வருகை ஓர் திருவிழா,  
இன்று மின்னஞ்சல் இல்லையேல் உறக்கமில்லா!  
கூட்டுக்குள் வாழ்ந்த குருவிக் குடும்பம்,  
கூகுளில் தேடுது இன்று இன்பம்!  
கருவி வளர்ந்தது விந்தையாக...  
மனிதன் தொலைந்தான் மந்தையாக?  
கனிமண் அடுப்பில் கனிந்த சுவை,  
மின்சார அடுப்பில் வேகம் மிகை!  
சக்கரம் சுழன்ற மாட்டு வண்டி,  
இன்று வானம் ஆளும் இயந்திர வண்டி!  
கூடிப் பேசிய திண்ணைப் பொழுது,  
திரைக்குள் சுருங்கியது உறவின் விழுது!  
அறிவியல் ஆக்கம் அழகிய வரம்,  
அறிவோடு கையாண்டால் என்றும் நலம்!





**Dharaneeshwar V**  
**III - A**



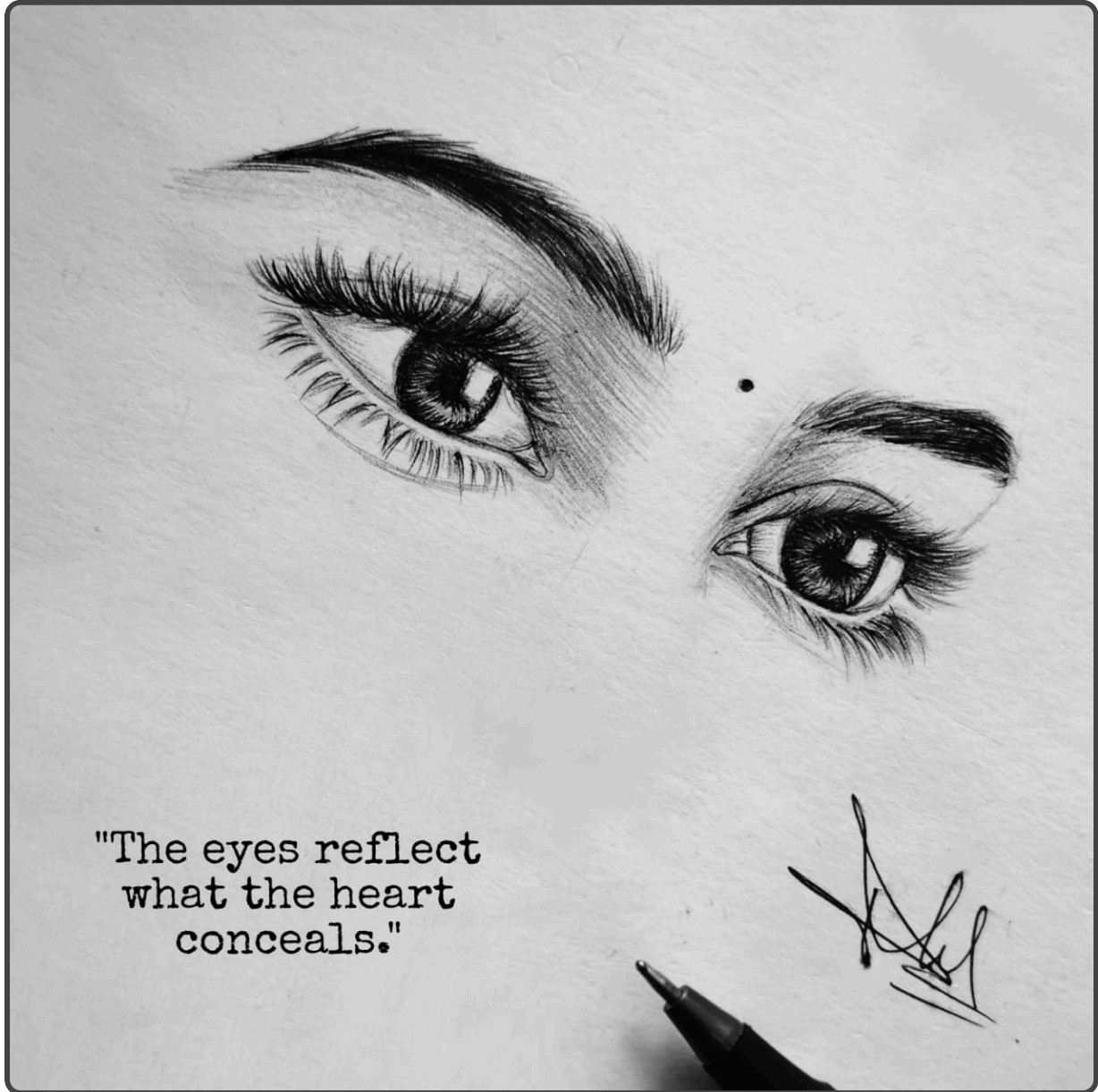


Dharaneeshwar V  
III - A



PAVISHNA R  
I - A





"The eyes reflect  
what the heart  
conceals."

*[Signature]*



**Dharaneeshwar V**  
**III - A**

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Raul John Aju (born 2007) is an Indian entrepreneur, AI technologist, content creator, and speaker. He is the founder of AI Realm Technologies and NyayaSathi, known for developing legal bots, automation tools, humanoid robotics and AI-powered clones. Aju is a three-time TEDx speaker and has taught over 140,000 students and businesses in topics related to artificial intelligence, robotics, and automation. Often recognized by his online handle "Raul\_the\_Rockstar," he publishes content on YouTube, Instagram, and other platforms, focused on AI, web3, crypto, metaverse, and related emerging technology.



**RAUL JOHN AJU**



**PRANJALI AWASTHI**

Pranjali Awasthi is an Indian-American entrepreneur and artificial intelligence (AI) innovator, best known as the founder and CEO of the AI startup Delv.AI. Born in India, she later moved to the United States, where she developed a strong interest in computer science and machine learning at a young age.

Awasthi gained recognition for building Delv.AI, a platform designed to simplify research by extracting and summarizing key information from large datasets. Her work focuses on improving accessibility to knowledge using AI-driven tools.

She has been featured in various media outlets for her achievements as a young entrepreneur in the tech industry and is considered one of the emerging voices in AI innovation.

