



ELECTRONICS · SVC DELHI

AANVIK

2026

ELECTRONICS THE SILENT POWER
BEHIND STRONG NATION

SRI VENKATESWARA COLLEGE
UNIVERSITY OF DELHI





**TIRUMALA TIRUPATI DEVASTHANAMS
SRI VENKATESWARA COLLEGE
UNIVERSITY OF DELHI**

DEPARTMENT OF ELECTRONICS

PREFACE

THE SILENT POWER BEHIND A STRONG NATION "Ideas, Innovation, and Impact"

Every time a communication satellite beams data back to Earth, a smart city grid optimizes its power, or a surveillance quadcopter takes flight to safeguard our borders, there is a silent engine driving it all: **Electronics**.

It is with immense pride and a deep sense of responsibility that the **Department of Electronics, Sri Venkateswara College**, presents the 8th Edition of **Aanvik**. As we continue our tradition of documenting academic milestones and creative breakthroughs, this volume explores a theme that is both incredibly timely and deeply foundational.

In previous years, we navigated the "Virtual Drift," delved into the "Meta World," and most recently explored the intersection of "Art & Technology."

This year, we turn our focus to the bedrock of our national resilience. Under the tagline "Ideas, Innovation, and Impact", we showcase how the "silent" world of circuits, sensors, and semiconductors forms the core of a sovereign, modern India.

Within these pages, we explore key pillars propelling our nation forward:

- **Defence:** Electronic systems and surveillance technologies safeguarding our borders.
- **Space Technology:** Hardware powering our reach for the stars.
- **Healthcare:** Electronics transforming diagnostics and patient care.
- **Infrastructure & Smart Cities:** Integration of IoT into urban life.
- **Digital Connectivity:** The backbone of our interconnected society.

But Aanvik '26 is more than a technical journal; it is a celebration of talent within our department. You will find research in SRI-VIPRA showcases, perspectives in Faculty and Student Articles, along with Comics, Digital Art, and Creative Corner pieces.

From digital electronics to student activities, Aanvik reflects who we are—innovators, creators, and thinkers. We invite you to join us on this journey and discover the "silent power" of electronics.

The Magazine Committee

Department of Electronics, Sri Venkateswara College



TIRUMALA TIRUPATI DEVASTHANAMS

శ్రీ వేంకటేశ్వర కళాశాల

श्री वेंकटेश्वर महाविद्यालय
Sri Venkateswara College

(दिल्ली विश्वविद्यालय) (University of Delhi)

NAAC A+ Accredited

Benito Juarez Road, Dhoola Kuan, New Delhi-110021

Ph. : 011-24112196

principal@svc.ac.in

प्रो. वज्जला रवि
प्राचार्य

Prof. Vajala Ravi
Principal

Message from the Principal's Desk

"The future belongs to those who understand the power of what lies beneath the surface."

In an era defined by rapid transformation and technological advancement, the true strength of a nation is no longer measured solely by what is visible, but by the systems that operate quietly behind the scenes. Electronics, in this regard, stands as a cornerstone of modern progress—subtle in presence, yet immense in impact.

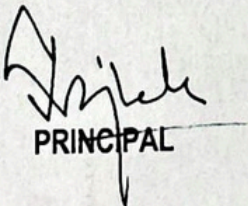
At Sri Venkateswara College, we take pride in nurturing an environment that encourages students to explore such foundational forces that shape our world. This year's theme, *"Electronics: The Silent Power Behind a Strong Nation"*, beautifully captures the essence of how innovation, when rooted in precision and purpose, can drive meaningful change.

From strengthening defence capabilities and enabling ambitious space missions to transforming healthcare, infrastructure, and digital connectivity, electronics plays a pivotal role in nation-building. It is the invisible thread that binds together efficiency, security, and advancement across sectors, ensuring that progress is not only achieved but sustained.

The seventh edition of the annual magazine 'AANVIK' reflects this vision with remarkable clarity. It showcases a diverse collection of student-driven work that is creative, analytical, and insightful. Through the lens of *Ideas, Innovation, and Impact*, this edition highlights not only the technical dimensions of electronics but also its profound influence on society and everyday life.

Such initiatives are a testament to the dedication and collaborative spirit of our students, faculty, and editorial team. Their commitment to excellence continues to elevate the academic and creative standards of the institution, inspiring a culture of curiosity and forward-thinking.

I extend my sincere appreciation to everyone involved in bringing this edition to life. May this endeavor continue to encourage young minds to innovate, to question, and to contribute meaningfully towards building a stronger, self-reliant, and future-ready nation.


PRINCIPAL



FROM

THE TEACHER-IN-CHARGE

"Electronics—silent in presence, yet profound in impact."

It is often said that the most powerful forces are those that work unnoticed, shaping outcomes without seeking attention. In today's world, electronics embodies this idea—functioning as the invisible framework that supports the complex systems of modern society.

From its early beginnings as a field rooted in circuit design, electronics has evolved into an indispensable domain influencing nearly every aspect of human life. What was once limited to basic applications has now become the driving force behind advancements in defence systems, space exploration, healthcare technologies, infrastructure, and digital connectivity.

The growth of electronics is not merely technological; it is deeply linked with human progress. Every innovation reflects a response to real-world challenges—enhancing precision, improving efficiency, and ensuring reliability across critical sectors. In many ways, electronics defines how effectively a nation can function and progress in an interconnected world.

The theme for this year, "Electronics: The Silent Power Behind a Strong Nation", captures this significance. It highlights the role of electronics in nation-building, where its contributions, though often unseen, are impactful. The focus on Ideas, Innovation, and Impact emphasizes the journey from concepts to meaningful outcomes.

This edition of AANVIK brings together diverse perspectives across multiple domains. The contributions reflect technical understanding, creativity, and awareness of the broader societal role of electronics.

I extend my sincere appreciation to all contributors and the editorial team for their dedication in bringing out this edition.

Happy reading!

Dr. Sunita Jain

Teacher - In - Charge

Department of Electronics



FROM

THE EDITOR-IN-CHIEF

"A nation's true strength is not measured by what it builds towards the sky, but by the silent networks that hold it all together."

When we visualise a nation's strength, our minds naturally gravitate towards the monumental – towering infrastructure, roaring launch vehicles, and the visible hallmarks of modern progress. Yet, as students of electronics, we know a different truth. We know that beneath every advanced system lies a quiet, tireless heartbeat.

It is with immense pride that I welcome you to the 8th edition of our annual department magazine, Aanvik '26. This year, we have chosen a theme that resonates deeply with the core of our discipline: "Electronics: The Silent Power Behind a Strong Nation." We are living in an era where technological sovereignty defines a country's future. Electronics no longer just supports our world; it drives it. From microcontrollers and surveillance systems securing our borders to IoT networks powering smart cities, the circuits we study are the invisible catalysts of change. They do not demand attention, yet they ensure that life-saving medical devices function with precision and our digital infrastructure remains resilient. Under our pillars of Ideas, Innovation, and Impact, this edition explores how this silent force transforms visions into realities.

Curating this magazine at Sri Venkateswara College has been an inspiring journey. Through technical submissions, Sri-Vipra projects, and the creativity of our department's artists and writers, this edition proves that we are doing more than soldering components or writing code—we are learning the language of innovation.

Bringing this vision to life required collective effort. I extend my gratitude to our faculty, editorial team, and contributors for their dedication. I invite you to explore these pages with curiosity and discover the silent power shaping our world.

Happy reading!

Samuel Matthews

Editor In-Chief, Aanvik '26



FROM

THE EDITOR-IN-CHIEF

"We don't use technology, we live technology." – Godfrey Reggio

This line stayed with me while working on AANVIK 2026, because it perfectly reflects the idea behind our theme, "Electronics: The Silent Power Behind a Strong Nation." We often think of technology as something external, tools we use when needed. But in reality, electronics has become a part of how we live, think, and function as a society.

As a student, I've realized that the most powerful systems are not always the most visible ones. A nation's strength is not just in what we can see, like infrastructure or defence equipment—but in the invisible electronics that make these systems work with precision and reliability. Whether it is sensors guarding borders, embedded systems guiding space missions, or medical devices monitoring lives, electronics operates quietly, yet its impact is everywhere.

This edition of AANVIK explores this silent strength through sub-themes like Defence Systems, Space Missions, Smart Cities, Digital India, Infrastructure, and Healthcare Technology. What makes this magazine special is not just the topics themselves, but the way they are understood and expressed by students. Each article and design reflects curiosity, creativity, and an effort to connect technical knowledge with real-world impact.

Working as the Chief Editor made me appreciate how innovation doesn't always mean something entirely new, it can also mean improving, refining, and understanding the systems that already shape our lives.

As you read this magazine, I hope you begin to notice what usually goes unnoticed. Because electronics may work silently in the background, but it is that very silence that holds everything together.

And sometimes, the strongest power is the one you never see—but always depend on.

Happy reading!

Mishti Angirash

Editor In-Chief, Aanvik '26



FROM

THE PRESIDENT

It truly gives me great happiness to present this edition of our department magazine. This magazine is not just a collection of articles, but a sincere reflection of the dedication, creativity, and efforts put in by our students and faculty members. Every page speaks about their enthusiasm and willingness to learn and express. It stands as a testament to the vibrant academic and creative culture that our department continues to nurture year after year.

In today's fast-changing world, especially in the field of electronics, learning is not limited to books alone. It requires curiosity, practical understanding, and the courage to explore new ideas. Our department always aims to create an environment where students feel motivated to think independently, ask questions, and develop both technical knowledge and personal confidence. Such an approach ensures that students are not only academically strong but also prepared to face real-world challenges with clarity and confidence.

This magazine beautifully showcases the diverse talents of our students. Along with technical knowledge, it highlights creativity, ideas, and perspectives that go beyond the classroom. Such platforms not only encourage self-expression but also help students build confidence and prepare themselves for future challenges. It also reflects the spirit of collaboration and mutual support among students.

I would like to sincerely appreciate everyone who contributed to this magazine. Your hard work, teamwork, and dedication have made this possible.

To all students, I encourage you to stay focused, keep learning, and never hesitate to try something new. Make the most of every opportunity you get.

I hope this magazine inspires you and makes you feel proud to be a part of our department.

Happy reading!

Deepika Bhardwaj

President, Department of Electronics

SPACE TECHNOLOGY



Electronics drives
every mission
beyond this world.

From precise navigation to deep space
communication, technology turns human
curiosity into limitless discovery.

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DEPARTMENT OF ELECTRONICS

DEPARTMENT
OVERVIEW



TEACHER'S GALLERY



Dr. Sunita Jain

Teacher In- Charge
Associate Professor

Thin Film SAW Devices



Dr. Neeru Kumar

Associate Professor
Semiconductor Devices



Prof. Lalita Josyula

Professor
Solid State Electronics



Dr. Nutan Joshi

Associate Professor
Wave Propagation



Dr. Hari Singh

Assistant Professor
Wearable Antenna, MIMO Antennas, Metamaterials



Dr. Rakhi Narang

Assistant Professor
Modelling and Simulation of Semiconductor Devices



Dr. Hina Yadav

Assistant Professor
Microstrip Antennas



Dr. Tarakeswara Rao

Assistant Professor
Atmosphere Science, IoT and Embedded Systems



Dr. Rahul

Assistant Professor
Signal Processing, Embedded AI, Biomedical Sensors

NON-TEACHING STAFF



Mr. P. Narasimha Rao

Laboratory Assistant



Mr. Reji Joseph

Laboratory Assistant



Mrs. Jayamma

Laboratory Assistant



Mrs. K. Manimala

Lab Attendant



Mr. Ashish Kumar

Lab Attendant



Samuel Mathews

Editor-In-Chief



Mishti Angrash

Editor-In-Chief



Tushar Patidar

Art & Design Head



Anshika Singh

Co-Designer



Aditi Pant

Co-Designer



Rachit Singh

Co-Designer

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LAT 5704
ALT 1500M

SIGNAL 72%

TARGET LOCK

PRECISION WARFARE POWERED BY ELECTRONICS

ID CODE 5292 13B

DISTANCE 1345 M
STATUS ONLINE
VISION 130%

PRECISION IS POWER

Advanced electronics drive modern defence systems, providing accurate target acquisition, tracking and engagement. From drones to ground forces, precision is ensured silently but effectively.

• AI GUIDED SYSTEMS • DRONES • RADAR • CYBERWARFARE

DEPARTMENT OF ELECTRONICS

INTRODUCTION



INTRODUCTION

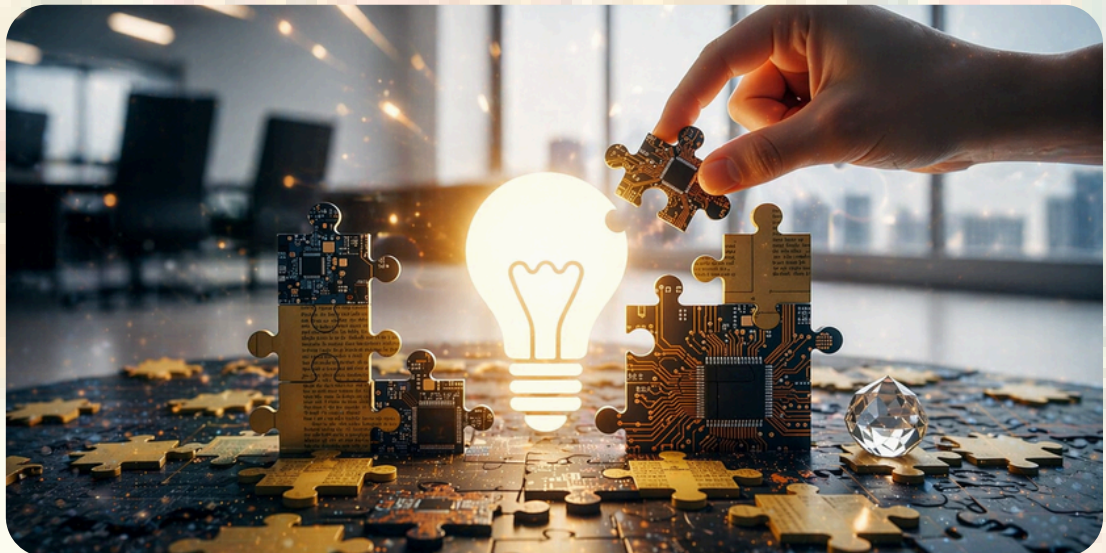
“Power is not always visible—it is often engineered.”

ELECTRONICS: THE SILENT POWER BEHIND A STRONG NATION

Power is often imagined in what we can see—towering infrastructure, advanced weaponry, or monumental achievements in space. Yet, the true strength of a nation often lies in what remains unseen. Beneath every system that defines modern progress exists an invisible force working with precision, reliability, and intelligence—**ELECTRONICS**.

Electronics is the silent backbone of a strong nation. It does not demand attention, yet it enables everything—from safeguarding borders and guiding spacecraft to powering hospitals, connecting communities, and sustaining infrastructure. It operates in the background, ensuring that complex systems function seamlessly, decisions are executed accurately, and lives are improved consistently.

In today's rapidly evolving world, the role of electronics extends far beyond circuits and devices. It is a catalyst for ideas, a driver of innovation, and a force that creates meaningful impact. Whether it is strengthening defence systems, enabling smart cities, advancing healthcare technologies, or supporting large-scale digital transformation, electronics shapes the way a nation grows, adapts, and leads.





At its core, electronics represents a fusion of engineering excellence and human ingenuity. Every microchip, sensor, and embedded system reflects countless hours of research, design, and problem-solving—quiet efforts that translate into powerful outcomes. From enabling real-time communication during critical operations to ensuring precision in life-saving medical equipment, its presence is both subtle and indispensable.

As nations move toward greater self-reliance and technological sovereignty, electronics becomes not just a support system, but a strategic asset. It fuels innovation ecosystems, empowers startups and industries, and creates opportunities that drive economic and social progress. In many ways, it defines how prepared a nation is to face the challenges of the future.

This edition explores the essence of this silent power through diverse perspectives and creative expressions. It brings together thoughts, designs, and analyses that reflect not just the technical significance of electronics, but also its profound human and societal influence.

Through the themes of Ideas, Innovation, and Impact, we aim to uncover how electronics quietly transforms vision into reality—building a nation that is not only technologically advanced, but also resilient, efficient, and future-ready.

**BECAUSE SOMETIMES, THE
STRONGEST FORCES ARE THE ONES
THAT WORK WITHOUT BEING SEEN.**



TEACHER'S VIEW

"A few weeks ago, our home Wi-Fi router stopped working in the evening. It was a small inconvenience, the kind that usually gets solved with a quick restart. But in the few minutes that followed, the house felt surprisingly different. Phones lost their connection, the television became just a screen (without Netflix!), and the familiar rhythm of our digital lives slowed down.



**DR. SUNITA
JAIN**

It made me realise how much of the world around us runs on systems we rarely notice. And electronics is one of them.

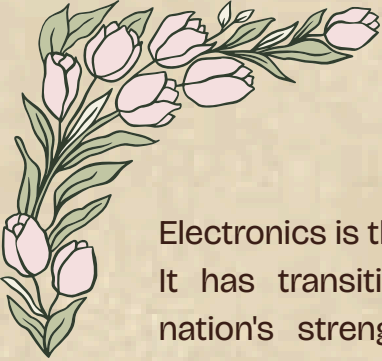
When we watch a space launch, the rocket naturally captures our imagination. Yet long after the excitement of lift-off fades, it is electronics that quietly continues the mission - sensors collecting information, processors interpreting it, communication systems sending signals across vast distances.

The same quiet presence appears closer to home as well - in medical equipment that helps doctors see what the eye cannot, in radar systems that keep watch over the skies, and in the networks that help our cities function a little more smoothly each day.

In the classroom, I find it fascinating to see where this larger story begins. A student connects a few components on a breadboard and a small LED lights up - a simple moment in a lab. But behind that small glow lies the same set of ideas that, in different forms, power satellites, hospitals, and the invisible networks that quietly keep our world connected.

In this age of Gen AI and rapidly evolving technologies, electronics rarely asks for attention. Yet for those curious enough to explore it, electronics reveals itself not just as a subject, but as one of the silent forces through which a nation designs its future."





Electronics is the unsung hero driving modern development. It has transitioned from convenience to foundation of nation's strength acting as connective link of modern economics and a determinant of geopolitical power.

From smartphones to satellites, electronics has revolutionized industries and transformed lives. It has enabled global connectivity, bridging distances and fostering international collaboration. In healthcare, electronics has led to advanced medical tech, improving diagnosis and treatment.

The transportation sector has seen a significant shift with electronics powering smart vehicles, enhancing safety and efficiency. Additionally, electronics is driving renewable energy solutions, reducing carbon footprint and promoting sustainability.

Electronics is the foundation of innovation, silently shaping the future. As technology advances, electronics will continue to drive innovation, making lives easier, more efficient, and connected. The future of electronics holds promises of even more groundbreaking tech, shaping societies and economies worldwide.



Electronics is and has been foundation of a progressive and technologically driven modern society. It has conspicuously driven the progress and dominance of a nation. Its influence is felt in almost every sector, like communications, healthcare, defence, education, and industry. It has been a mainstay in our daily lives in the form of Smartphones / Internet ensuring, above all, connectivity with high degree of efficiency and speed. Other areas where it has affected most is medical imaging systems and satellite communications

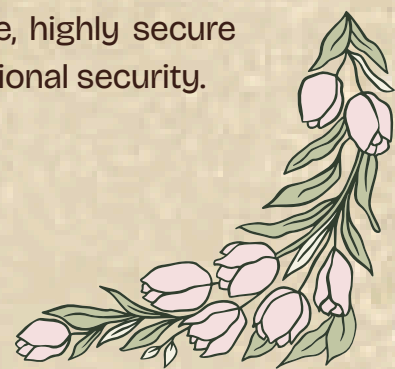
Advanced Electronic systems in Defence enable active surveillance, highly secure communication, and absolute precision weaponry, strengthening national security.

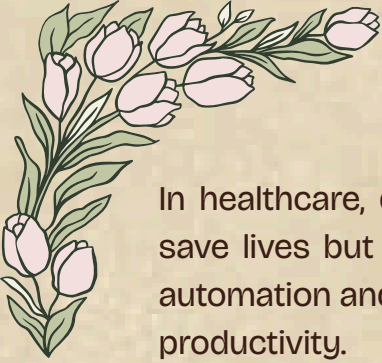


**DR. NEERU
KUMAR**



**PROF. LALITA
JOSYULA**





In healthcare, devices like diagnostic machines and monitoring systems not only save lives but also improve the quality of medical care. Industries heavily rely on automation and control systems powered by non-other than electronics to enhance productivity.

Electronics vastly supports economic growth by fostering innovation, creating job opportunities, and promoting digital transformation. Initiatives like smart cities (Internet of Things) and Digital Governance are made possible through Electronic Technologies.

Though it works silently in the background, Electronics is a powerful force that sustains development, ensures security, and enhances the overall efficiency of a nation. It truly acts as the backbone of a strong and progressive country.



"Nation building is a complex process involving economic growth, governance with an aim to make progress in society . Nations are not built in a day. From ground to sky, electronics is silently making its presence everywhere. Imagining life without smartphones, automobiles, EVs, Televisions, gaming, GPS, satellites is not only difficult but unthinkable. Think of healthcare and one thinks of MRI, CT scans, BP monitors, smart speakers, vacuum cleaners, pacemakers and what not, all electronics! 5G networks are a testament to how electronics is driving smartness all around and significant in measuring progress of nations.



**DR. NUTAN
KALA JOSHI**

Any gadget one thinks of now, the word electronics echoes into our ears and mind! It has become a wake-up call and very rightly so that one of the parameters in nation's overall growth and progress is definitely the strides in its electronics sector. Electronics is the backbone of today's life, silently powering progress. Electronics is indeed omnipresent making life more convenient, efficient and connected."





The single most valuable mindset an electronics student can develop is the Debugger's Mindset—specifically, the realization that a circuit never lies, and it never disobeys the laws of physics. When a circuit doesn't work as expected, the natural instinct for a beginner is to feel like they have "failed" or that the components are somehow broken. A student with a debugger's mindset understands that the circuit is actually functioning perfectly according to how it is physically built and the actual environment it is in, not how it was neatly drawn on paper.

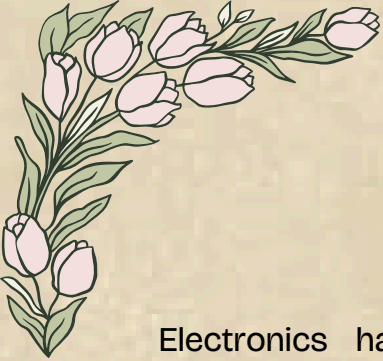


**DR. HARI
SINGH**

Developing this mindset requires a few key shifts in perspective:

- **Embracing Non-Ideality:** They stop expecting absolute perfection from their components. They anticipate noise, tolerate parasitic capacitance, and understand that components have tolerances and thermal limits.
- **Valuing Data Over Expectation:** If a set of current observations yields fluctuating readings—say, bouncing between 41.7 mA and 42.6 mA—rather than a clean, theoretical number, they don't just pick the reading they like best and move on. They calculate the mean, evaluate the standard and average deviations, and determine the probable error to genuinely understand the reality and reliability of their system.
- **Systematic Isolation:** Instead of tearing apart an entire breadboard in frustration when an output is zero, they methodically trace the signal path. They isolate variables, checking the power supply, then the first stage, then the next, turning a frustrating failure into a logical puzzle. Ultimately, cultivating this rigorous, analytical mindset is what transforms a student from someone who simply follows a lab manual into an engineer capable of designing the robust, real-world systems that serve as the silent power behind a strong nation's infrastructure and technological growth.





Electronics has completely reshaped our lives. It has completely changed the way we used to work, learn and relax. Smartphones have merged multiple apps and tools into one. Finding the best and shortest route through Google Maps, tracking my number of steps using a fitness app, shopping without actually going to a market, watching movies or web series on the go or streaming my favourite music while travelling. Electronics have shifted our lives from effort-based to access-based. Earlier, we needed effort, time, and physical presence. Now, we just need internet connectivity and a device.



**DR. RAKHI
NARANG**



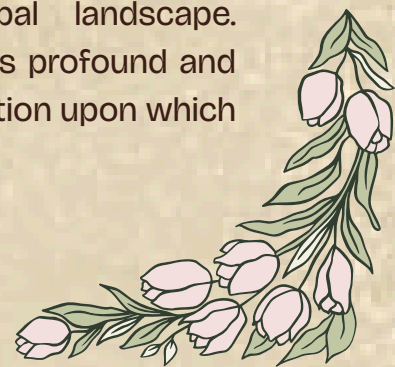
Infrastructure and Power Systems: Engineering the Pulse of a Resilient Nation.

From smartphones and satellites to advanced defense technologies, electronics forms the backbone of modern infrastructure. Intelligent grids, decentralized generation, and integration of renewable energy sources are transforming traditional power architectures into adaptive, cyber-physical ecosystems. High-voltage transmission networks, energy storage technologies, and real-time monitoring ensure efficiency, reliability, and stability under dynamic demand conditions.



**DR. HINA
YADAV**

Robust infrastructure enables seamless industrial operations, digital connectivity, and urban expansion while minimizing environmental impact. Strategic investments in smart infrastructure and sustainable power systems not only enhance energy security but also accelerate innovation, positioning nations to thrive in an increasingly technology-driven and resource-constrained global landscape. Electronics may operate quietly behind the scenes, but its impact is profound and far-reaching. It is not just a field of study or industry—it is the foundation upon which modern nations build their strength, resilience, and future.





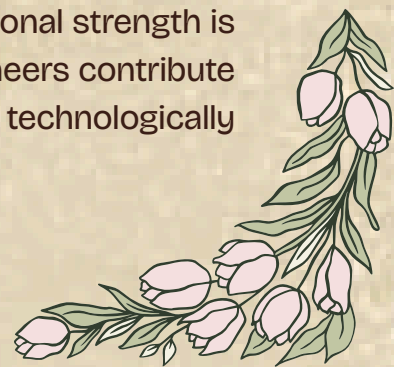
"Electronics forms the technological backbone of modern society. From communication networks to defence systems, healthcare devices, and industrial automation, electronic technologies quietly power the infrastructure that supports national development. For electronics students, understanding electronics means understanding the systems that drive innovation and progress. At the core of electronics are semiconductor devices, integrated circuits, and embedded systems. The development of microprocessors and microcontrollers has enabled compact, high-performance systems capable of performing complex tasks with efficiency and precision.

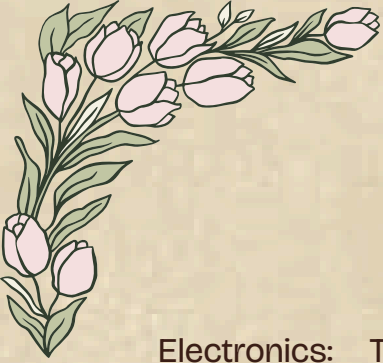


**DR.
TARAKESWARA
RAO KAVITI**

These technologies are widely used in consumer electronics, transportation systems, and advanced computing platforms. Industrial automation is another field driven by electronics. Technologies such as the Internet of Things (IoT), robotics, and programmable control systems enable smart manufacturing and efficient resource management. Sensors and embedded controllers allow real-time monitoring and control of industrial processes. Communication engineering is one of the most impactful areas of electronics. Technologies such as wireless communication, fiber-optic transmission, and modern mobile networks allow rapid data exchange across the world. Concepts like digital signal processing (DSP), modulation techniques, and RF communication form the foundation of these systems, enabling reliable and high-speed connectivity. In healthcare, biomedical electronics supports accurate diagnosis and patient monitoring through devices such as ECG monitors, imaging systems, and wearable sensors. These technologies combine sensors, analog circuits, and digital processing to deliver precise medical data and improve patient care.

Electronics also plays a critical role in national security. Radar systems, satellite communication, navigation equipment, and unmanned systems rely heavily on advanced electronic circuits and signal processing. The ability to design and develop such technologies domestically strengthens a nation's technological independence. In conclusion, electronics may operate silently, but its impact on national strength is profound. By advancing research and innovation in electronics, engineers contribute to building smarter infrastructure, stronger industries, and a technologically empowered nation."





Electronics: The Silent Power Driving Healthcare Innovation and Space Exploration

Electronics is an unseen force that drives a nation's strength and progress. From hospitals to space laboratories, it operates quietly in the background, powering systems that improve quality of life, enhance security, and accelerate innovation.

In healthcare, electronics has revolutionized diagnosis, monitoring, and treatment.



DR. RAHUL

Advanced imaging systems, wearable devices, and remote monitoring technologies enable early detection and continuous patient care. Telemedicine has expanded access to medical services, especially in remote regions, bridging the urban-rural divide. Critical equipment such as ventilators, patient monitors, and robotic surgical systems depend on precise electronic control, ensuring accuracy and reliability in life-saving situations. This transformation is shifting healthcare toward a more preventive, personalized, and efficient model.

In space missions, the role of electronics becomes even more critical. Satellites, launch vehicles, and space probes rely on robust electronic systems to operate under extreme conditions. Communication modules, onboard computers, sensors, and navigation systems must perform flawlessly despite radiation, temperature extremes, and vast distances. Beyond exploration, these missions support essential services such as weather forecasting, disaster management, communication, and navigation, thereby strengthening national infrastructure and resilience.

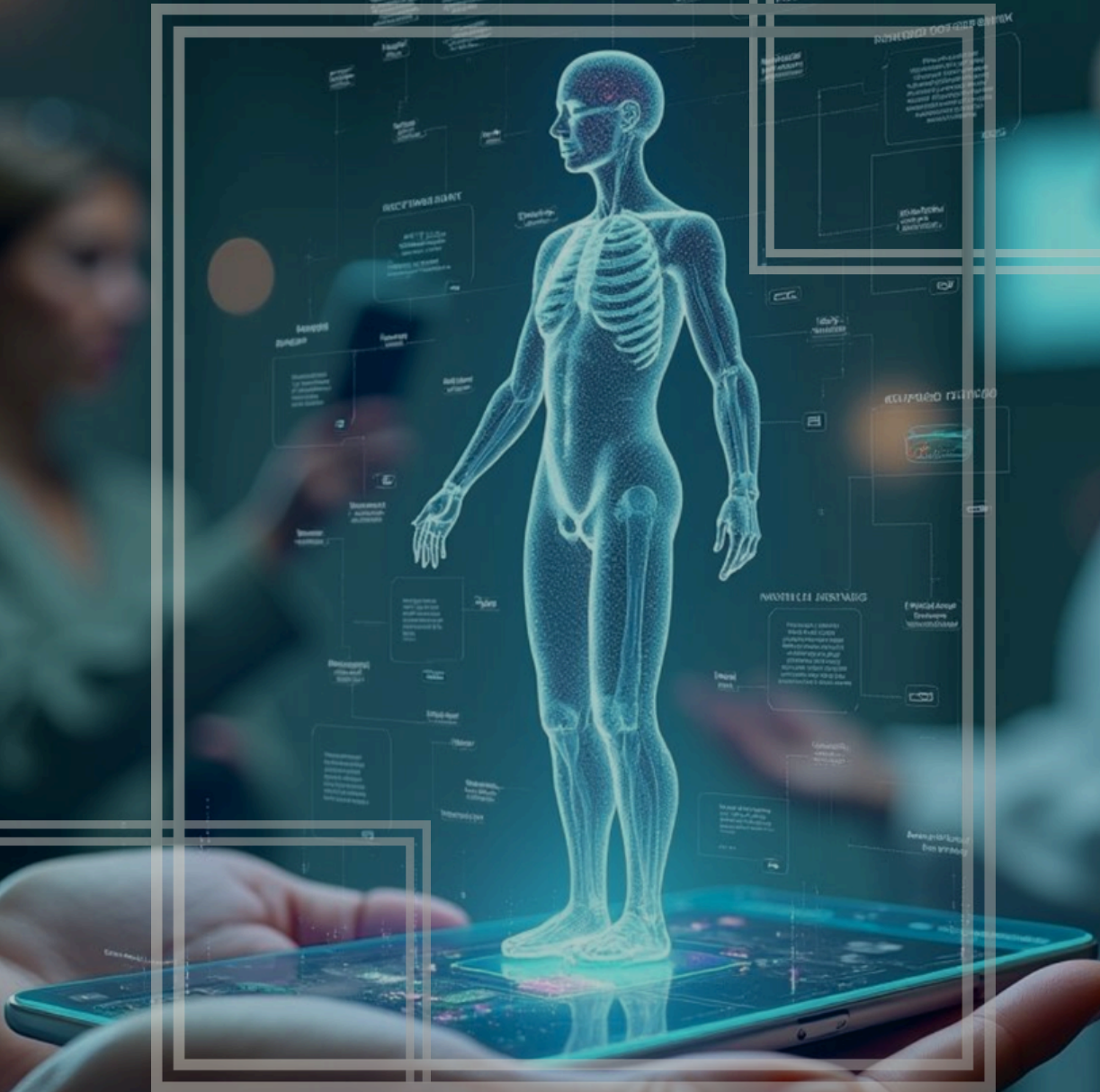
The integration of electronics across healthcare and space sectors underscores its strategic importance. It enhances precision, enables faster decision-making, and improves overall system efficiency. At the same time, the development of indigenous electronic technologies reduces dependence on imports and promotes economic growth.

Ultimately, electronics serves as a silent yet powerful enabler of national development. By advancing healthcare systems and strengthening space capabilities, it plays a crucial role in building a self-reliant, secure, and technologically progressive nation.



HEALTHCARE TECHNOLOGY

PRECISION AND CARE IN THE DIGITAL AGE



—◆◆◆◆—
**ELECTRONICS REVOLUTIONIZE HEALTHCARE,
ENSURING ACCURATE DIAGNOSTICS, AND
PERSONLIZED CARE THROUGH AI,
CONNECTED DEVICES AND REAL-TIME.**

DEPARTMENT OF ELECTRONICS

FACULTY
ARTICLES

SEMICONDUCTOR DEVELOPMENT IN INDIA: POLICIES, PROGRESS, AND FUTURE DIRECTIONS



PROF. LALITA JOSYULA



DR. RAHUL

DEPARTMENT OF ELECTRONICS | SRI VENKATESWARA COLLEGE | UNIVERSITY OF DELHI

Abstract Semiconductors are central to modern digital technologies, enabling devices from smartphones to advanced computing systems. To strengthen domestic capabilities, the Government of India has introduced initiatives such as ISM, PLI, and DLI, aimed at promoting local manufacturing and reducing import dependence. With increasing demand across sectors like AI, automotive, consumer electronics, and data centres, India is moving steadily toward building a strong and self-reliant semiconductor ecosystem, despite challenges related to infrastructure and high investment requirements.

1. INTRODUCTION

India has established itself as a major hub for semiconductor design, contributing a substantial share of the global design workforce, estimated at nearly 20% [1]. Building on this capability, the government launched the Semicon India Programme under the broader vision of Atmanirbhar Bharat, with the goal of developing a complete semiconductor value chain, including design, fabrication, assembly, testing, and packaging [2].

Supported by significant investments and policy backing, India is positioning itself as a credible alternative in the global semiconductor supply chain [3]. This paper examines the country's progress by analyzing policy initiatives, market trends, investment activities, workforce development, and future growth prospects.

2. CURRENT MARKET LANDSCAPE

India's semiconductor market is currently valued at approximately USD 45–50 billion in FY2024–25 and has been growing at a strong pace, with an estimated compound annual growth rate of around 20% [3]. It is projected to reach nearly USD 120 billion by 2030 and could expand to USD 300 billion by 2035 [3].

Key Growth Drivers

- Expansion of artificial intelligence infrastructure and data centers
- Increasing adoption of electric vehicles
- Rising demand for consumer electronics
- Government initiatives promoting domestic manufacturing

The rapid expansion of data centre infrastructure is expected to further accelerate demand for high-performance chips [4]. By 2035, sectors such as mobile devices, automotive electronics, computing systems, and data centres are likely to contribute more than 70% of semiconductor demand in India [3].

3. POLICY FRAMEWORK

Semicon India Programme India's semiconductor ecosystem is being shaped by a well-structured policy framework designed to support manufacturing, design, and innovation.

3.1 Production Linked Incentive (PLI)

The PLI scheme has significantly boosted electronics manufacturing in the country. Production output has increased from around INR 1.9 lakh crore in 2014-15 to over INR 11 lakh crore in 2024-25, highlighting the impact of this initiative [2].

3.2 Design Linked Incentive (DLI)

The DLI scheme focuses on strengthening domestic chip design capabilities. More than 20 companies are currently engaged in developing semiconductor solutions for applications such as artificial intelligence, communication systems, and smart infrastructure [2].

3.3 India Semiconductor Mission (ISM)

ISM acts as the central coordinating body for semiconductor initiatives in India. It has facilitated the approval of multiple fabrication and packaging projects, with total investments exceeding INR 1.6 lakh crore [2].

3.4 Recent Policy Developments

The Union Budget 2026-27 introduced ISM 2.0, which includes additional funding and emphasizes ecosystem development, particularly in areas such as materials, equipment, and workforce training [5].

4. INVESTMENT LANDSCAPE

India's semiconductor manufacturing ecosystem is gradually evolving, supported by both domestic and international investments.

Key Highlights

- Approval of around 10 semiconductor projects with investments close to USD 19 billion [2]
- Additional proposals worth USD 20–25 billion currently under evaluation [3]
- Total expected investment of approximately USD 50 billion over the next five years [3]

Major Projects

Semiconductor fabrication plant by Tata Group in Dholera, Gujarat

Micron Technology's assembly and testing facility in Sanand, Gujarat

HCL–Foxconn semiconductor unit in Jewar, Uttar Pradesh

Tata Semiconductor Assembly & Test (TSAT) facility in Assam

SiCSem silicon carbide semiconductor project in Odisha (expected to become operational by 2027–28)

These developments indicate that India is progressing toward establishing both fabrication and advanced packaging capabilities [3].

5. TALENT DEVELOPMENT AND WORKFORCE

India's workforce is one of its strongest advantages in the semiconductor sector. The current talent pool is estimated at around 250,000 professionals and is expected to grow to approximately 400,000 by 2030 [6].

Key Initiatives

- **Chips to Start-up (C2S) programme**
- **Introduction of specialized VLSI and semiconductor courses**
- **Establishment of SMART labs for skill development**

Challenges

- **Shortage of skilled professionals in fabrication processes**
- **Limited availability of mid-level and senior experts**
- **Concentration of talent in major metropolitan areas**

Addressing these challenges will be essential for sustaining long-term growth in the sector [6].

6. INFRASTRUCTURE CHALLENGES

Semiconductor manufacturing requires highly reliable and resource-intensive infrastructure.

Major Issues

- High power consumption and need for uninterrupted electricity supply
- Large water requirements for fabrication processes
- Higher logistics costs compared to global competitors

Ensuring infrastructure readiness will be critical for the successful operation of semiconductor fabs in India [7].

7. MARKET PROJECTIONS AND DEMAND

India's semiconductor demand is expected to grow exponentially.

Year	Market Size	Key Drivers
FY2024-25	\$103-120 Billion	AI, EVs, data centres [4]
2030	\$45-50 Billion	Current baseline [3]
2035	\$300 Billion	Full ecosystem growth [3]

Table 1: India's semiconductor demand

Currently, India imports more than 90% of its semiconductor requirements. However, domestic manufacturing is expected to increase significantly, potentially meeting over 60% of demand by 2035 [3].

8. STARTUP ECOSYSTEM AND INNOVATION

India's semiconductor startup ecosystem is gradually gaining momentum, supported by policy initiatives and improved access to design tools.

Focus Areas

- Electronic Design Automation (EDA)
- AI-driven chip design
- Smart manufacturing and analytics solutions

Government support through the DLI scheme is enabling startups to scale their operations and contribute to innovation in the sector [2].



9. FUTURE OUTLOOK

India aims to establish itself as a global semiconductor hub by 2032 through sustained policy support and investments [5].

Strategic Priorities

- Strengthening infrastructure
- Expanding and upskilling the workforce
- Building global partnerships
- Encouraging innovation and startup growth

The transition from policy announcements to effective implementation will play a crucial role in achieving these goals.

10. CONCLUSION

India's semiconductor sector is at a crucial stage of development. Strong policy initiatives, increasing domestic demand, and a large talent base provide a solid foundation for growth.

However, challenges such as infrastructure readiness, talent gaps, and execution risks must be addressed.

With continued government support and collaboration with industry stakeholders, India has the potential to emerge as a significant player in the global semiconductor ecosystem in the coming years.

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THE INVISIBLE ARCHITECT: ELECTRONICS AS THE SILENT POWER BEHIND A STRONG NATION



DR. HARI SINGH

DEPARTMENT OF ELECTRONICS | SRI VENKATESWARA COLLEGE | UNIVERSITY OF DELHI

DEAR STUDENTS, COLLEAGUES, AND ALUMNI,

When you walk into our labs here at the Department of Electronics at Sri Venkateswara College, the first things you see are oscilloscopes, microcontrollers, tangles of connecting wires, and breadboards. It is easy to get lost in the immediate task: debugging a circuit, writing a piece of embedded code, or analyzing a waveform. But as educators, what we truly hope you see when you look at that silicon and copper is the very foundation of modern national strength.

We often measure a nation's power by its visible monuments—its economic hubs, its military fleets, or its grand infrastructure. Yet, the true engine driving these modern marvels operates entirely out of sight. Electronics is the silent power behind a strong nation, the invisible architect of our safety, prosperity, and future. This field underpins our sovereignty, economy, and security—often without fanfare.

SECURING THE BORDERS AND THE SKIES

Consider national defense. Modern security is no longer just a matter of physical might; it is profoundly electronic. The radars that guard our airspace, the encrypted communication networks that connect our forces in remote terrains, and the avionics that guide our aircraft are all marvels of electronics. When we celebrate the monumental achievements of ISRO—like the flawless landing of Chandrayaan-3—we are celebrating triumphs in signal processing, sensor integration, and robust embedded systems. India's indigenous Tejas fighter jet, powered by electronic warfare suites, exemplifies self-reliance, reducing dependence on foreign tech and bolstering our borders. These technologies do not make noise, but they project India's strength across the globe and into the cosmos.



THE BACKBONE OF ECONOMIC RESILIENCE

India's emergence as a global economic powerhouse is deeply intertwined with its electronic prowess. The digital public infrastructure that we use every single day, such as the UPI system handling billions of seamless transactions, relies entirely on robust servers, fiber-optic networks, and the mobile devices in our pockets. Without the silent hum of data centers and the rapid switching of billions of transistors, the modern economy would grind to a halt. Electronics has democratized access to banking, education, and healthcare, uniting a vast nation through connectivity.

PIONEERING A SUSTAINABLE FUTURE

As our nation looks toward a sustainable future, electronics is once again stepping up. The transition to renewable energy relies on power electronics to efficiently convert and distribute solar and wind energy. The electric vehicles (EVs) hitting Delhi's roads are essentially rolling computers, relying on complex battery management systems and motor controllers. You, the electronics engineers of tomorrow, are the ones who will design the smart grids and energy-efficient systems that will keep our air clean and our cities thriving.

A MESSAGE TO OUR STUDENTS

To the bright minds of SVC's Electronics Department: the equations you study today are the blueprints for tomorrow's national infrastructure. When you solder a component, program a microprocessor, or design an antenna, remember that you are not just completing an experiment. You are learning the language of national development.

The strength of a nation is ultimately determined by the innovation of its people. As you move forward from the corridors of the college out into the world, carry with you the understanding that your field is the silent heartbeat of India. Keep innovating, keep questioning, and keep building. The nation relies on the circuits you will design.

Electronics isn't just circuits; it's the backbone of a Viksit Bharat. Let's harness it.



DEPARTMENT OF ELECTRONICS

STUDENTS
ARTICLES

"FROM BRAIN-LIKE CHIPS TO QUANTUM PROCESSORS, 2025 MARKED A TURNING POINT IN ELECTRONICS INNOVATION."

ROSHAN RAUAT | YEAR I

"Electronics 2025: A Year of Breakthroughs"



BRAIN AND ELECTRONICS

Neuromorphic Chips: Brain-Inspired Computing: Scientists made huge strides in "brain-like" chips that mimic neural pathways. Unlike traditional Von Neumann architecture, these chips process and store data in the same place, drastically reducing power consumption for AI tasks. Neuromorphic chips mimic biological neural networks, enabling ultra-low-power AI for edge devices.

Brain-Computer Interfaces (BCIs): BCIs are moving from research labs to real-world applications—enabling assistive tech, gaming, and medical breakthroughs. According to IEEE and PwC, BCIs require ultra-low-power AI accelerators, secure SoCs, advanced sensors, and biocompatible packaging for implantable devices.

Neural Earbuds: Smithsonian Magazine highlights NAQI neural earbuds that allow users to control computers and other devices using only facial and eye movements. A major highlight was the release of earbuds that use gyroscopes and facial muscle sensors to let users control devices by clenching their teeth or tilting their head—zero touch required.



ELECTRONICS CIRCUITRY

Embedded Systems: Embedded systems are an unavoidable part of any electronic device nowadays, and they have a crucial role in deciding the speed, security, size, and power of devices. Since we are in the transition phase of a connected world, there is high demand for embedded systems. So, the designing and manufacturing sector of such systems is undergoing numerous innovations to improve performance, security, and connectivity capabilities.

US-based start-up Dover Microsystems offers security solutions for protecting devices against network-based attacks at the processor level. The start-up's hardware-based technology guards the host processor by monitoring and screening every instruction executed based on a set of security, safety, and privacy rules.

Printed Electronics: Printing electronic components on a semiconductor substrate is one of the most effective ways to reduce the overall cost of the manufacturing process. So, manufacturers are always trying to tackle this challenge by searching for new technologies and advancements in conventional printing technologies. Unlike traditional semiconductors that use tiny wires as circuits, 3D-printed electronics rely on conductive inks and often flexible films. Further, advancements in printing technologies allow the flexible hybrid electronics field to obtain enough momentum.

Miniaturized Electronics: Miniaturization has enabled the use of electronics in several novel application areas. Particularly, healthcare and automotive industry applications have space limitations in terms of implementing specific devices. Previously, the miniaturization concept was limited by practical handling, display, and battery—not by the built-in electronics. There are innovations happening to make electronic components as small as possible while maintaining speed, reliability, and efficiency. Another important aspect of miniaturization is the integration of more and more features into a single component. For example, nanonet sensors and forksheet FET are a couple of recent developments in miniaturized electronic components.

Swedish start-up AlixLabs provides an atomic layer etching (ALE)-based method for manufacturing nanostructures with a characteristic size below 20 nm. The start-up's technology achieves nanostructure fabrication beyond the resolution limit for optical and electron beam lithography. The start-up also enables an economically affordable way of transistor channel scaling for sub-20 nm technology nodes. Further, this allows for a higher level of device integration, in turn reducing costs, increasing speed, and lowering the energy consumption of devices.

INFRASTRUCTURE AND CONNECTIVITY

5G: 5G refers to the fifth generation of mobile network technology, offering high speed, low latency, and high capacity. It enables seamless connectivity with devices and applications. It will drive the future of IoT, AR/VR, smart cities, autonomous vehicles, and remote surgeries. Enhanced mobile broadband will support high-definition video streaming, gaming, and virtual meetings.

6G Trials: The first significant 6G trials began in late 2025, reaching speeds up to 100 times faster than 5G. This relies on terahertz (THz) transceivers.

Bluetooth 6.0: Offers ultra-precise, centimetre-level location tracking, boosting efficiency in logistics and security.



ADVANCEMENTS IN QUANTUM COMPUTING

Quantum Computing: Beyond Binary

The age of quantum computers is not fully here yet, but 2025 saw major breakthroughs bringing it closer. Google unveiled its Willow chip, followed by Microsoft's Majorana 1 and Amazon's Ocelot, while IBM prepared its Nighthawk processor. These advances made quantum systems more stable and reliable, sparking what experts call a "Cambrian explosion" in the field. Though engineering challenges remain, the race is now about scaling fastest. Quantum computing promises breakthroughs in cryptography, drug discovery, and optimization. Unlike classical bits, qubits leverage superposition and entanglement to explore multiple computational paths simultaneously.

HOW SIGNALS CONTROL A CITY:

The Invisible Electronics Behind Smart Infrastructure

TARAN GROVER | YEAR I



THE TRAFFIC LIGHT

A normal traffic light is blind, and rigid - 60 seconds green and 60 seconds red, whether there are 50 vehicles or 5. This inflexibility causes unnecessary congestion, delays, long idling times even in low traffic hours. To solve this, cities introduced smart intersections. Smart intersections are modernized traffic signals that react to real-time road activity - they have their own ears (sensors), eyes (cameras) and a brain (AI) to power it all. They adjust themselves dynamically based on the demand. The sensors and the cameras installed on intersections detect the density of vehicles, pedestrians, and emergency vehicles in each lane. However, a single controller does not make the decision alone, it sends the data to the city's central control system which takes into consideration adjoining intersections through an optimization algorithm to take an informed decision. Decisions like - if this lane gets green now, will the next junction become congested? When several junctions along a corridor talk to each other, they create a "green wave." Vehicles move at a steady speed, meet consecutive greens, and reducing stops, fuel waste, and frustration. Smart intersections aren't just for cars - but pedestrians and emergency vehicles too.

This new modernized traffic light system is already powering major cities, including Bengaluru which uses “Bengaluru Adaptive Traffic Control System (BATCS)” which has reduced the waiting time by 33%, reduced travel times by 20% and already powering 165+ junctions. Cameras that do more than just watch. A CCTV Camera today is more than just a recorder. Many modern cameras include AI processors inside them capable of processing the video feed in real-time directly on the device - this is called Edge Processing. Instead of sending every frame to a server, the camera itself can detect events such as vehicle speeding, traffic laws violations, or even waterlogging after a rain and pothole detection. Then these alerts are sent to the server along to be processed further and action is taken. All these alerts are sent to Integrated Command and Control Centre (ICCCs) which are installed in major smart cities which act as the brain and nerve center of the cities with a decision support system for enhancing quality of life for citizens. They help cities achieve more with less real-time data, promoting more efficiency in monitoring, traffic management, solid waste management or water distribution management. Some cities which have adopted traffic management systems as part of their ICCCs include Ahmedabad, Chandigarh, Kanpur, Ludhiana, and more. The same cameras that manage traffic can monitor infrastructure. Potholes, broken streetlights, flooding during monsoon; these can be detected automatically through image analysis. Instead of waiting for citizen complaints, the city can detect and respond to problems on its own.

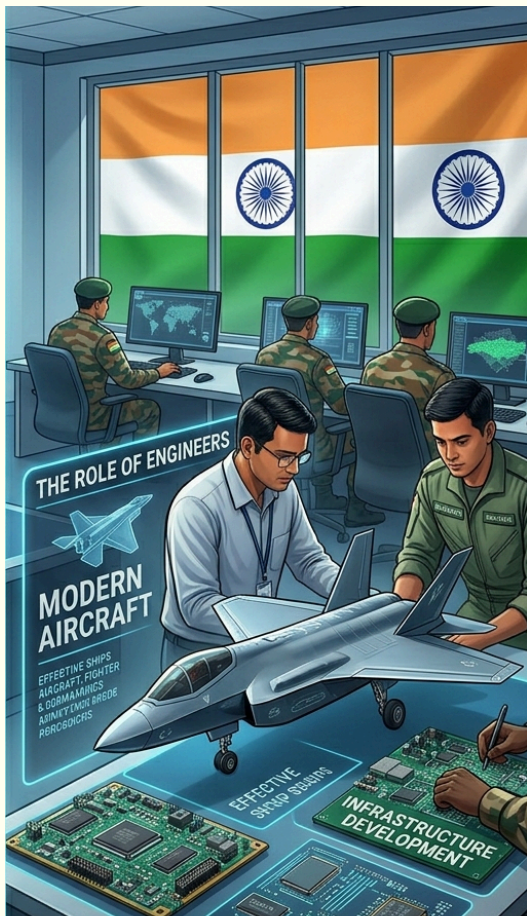
These systems must operate 24/7 under heat, dust, rain, power fluctuations, and network issues. Electronics in traffic cabinets are ruggedized. Systems maintain regular backups and software programs are designed to recover automatically from errors. The goal is simple: the system must keep working even when parts of it fail. This resilience is what turns smart experiments into dependable infrastructure.

CONCLUSION

Electronics have powered cities in ways we couldn't have imagined before. It gives the city the ability to see, hear, and respond to events and changes. Manual monitoring is reduced, delays minimized and decisions are taken in milliseconds - without waiting on a human operator. These machines and systems can store historical data, act on past trends in ways a human never could. In daily lives, for a citizen it has reduced waiting times, made daily movement smoother and improved response times in emergency situations; broken roads are detected quicker and fixed quicker which enhances safety of citizens. Whether we notice or not, electronics play a huge role in our day-to-day lives while staying completely invisible and that quiet intelligence is what truly makes a city smart.

From Signals to Security: Electronics in Modern Warfare

KUNDAN KUMAR SINGH | YEAR I



When we talk about modernization, there is a huge contribution of electronics in every sector of the world, e.g., defense, space, research, smart cities, etc. In the sector of defense, electronics work as the backbone of the modern defense system, which enhances the strength of the country.

THE RADAR SYSTEM

The radar evolution, transforming information, wireless connectivity in the enemy areas all are the part of the modern electronic radar system. Electronic are the foundational “nervous system” of modern defense radar system. The use of upgraded radar system in our defense sector which increase the strength of detection of missile, rocket which are far away by the range of old radar or non upgraded radars.

In the field of battleground radar providing the information of enemies, adverse weather condition, ground movement which make the soldier to active, alert about the movement of battleground.

Advance signal processing(DSP & Ai): Modern radars use digital signal processors (DSPs) to filter or make the less chance of error or allowing for the detection of small, stealthy or low flying targets.

Use of Artificial Intelligence (AI) improves the realibility of radars and make them as a smart to work rapidly. A radar system of the defense is the important part of the security of a nation and enhance and support to the security of a nation.

ROLE OF ELECTRONIC IN A SECURITY SYSTEM OF A NATION

The use of electronic component in focusing the targets, launching of missile, monitoring of every small movement in tense region all are easy to happen by the help of modern electronic. The control system of defense equipment, signal transforming, communication all are based on the electronic. In comparing the nowadays security system with old days security system, the role of electronic increasing day by day and these increase of participation of electronic make the nation defence system more secure, effective, increase the accuracy of security.

The use of modern equipment enhance the strength of security of a nation. Electronic form the basis of advanced weaponry, including drones radars, missile guidance ,etc. They enhance the strength of military forces to detect, track, and engage targets with high accuracy . Electronic surveillance tools such as LIDAR , infrared sensors, provides intelligence on enemies activity and assist in border security.

THE CONTRIBUTION OF ENGINEERS IN MAKING DEFENCE SYSTEM MORE SECURE

Engineers contributes silently or indirectly to the defense system by designing, building of modern equipment for military,modern craft, fighter planes for air defence , modern or effective ships and submarine for navy force. They build up the infrastructures and advanced technologies that ensure security without requiring public recognition. Combat engineers,often called “snipers” or “pioneers,” who build essential infrastructure under fire, such as bridge, road, helipads, and hardened blast-resistant shelters.

CONCLUSION

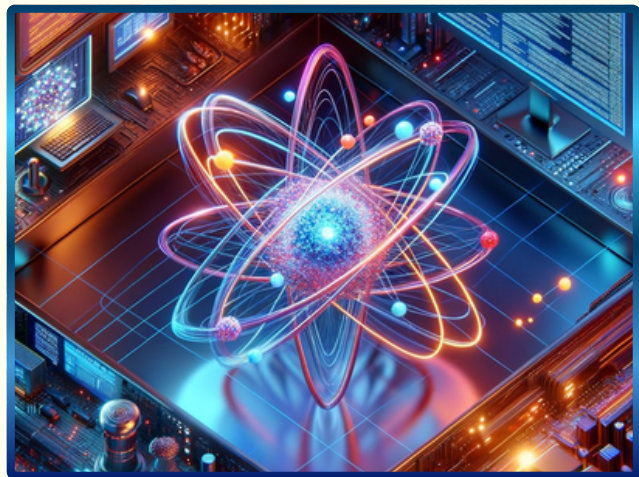
Ectronic makes the defence system of a nation more secure and powerfull than the non upgraded or old system. The use of more electronic equipment in defence enhance the strength of the nation.



QUANTUM SENSING: THE WHISPERING POWER OF ATOMS

Ankit Namdev | Year I

Imagine a world where a submarine can navigate the deepest oceans for months without ever needing a GPS signal. Imagine a doctor can "see" a single malfunctioning cell in your brain without needing a giant, noisy MRI machine. This isn't science fiction; it is the "silent power" of Quantum Sensing, the technology that is currently placing India at the forefront of a global scientific revolution.



WHY DO WE NEED "QUANTUM SENSING"?

For decades, our world has relied on "classical" sensors. Whether it's the compass in your phone or the radar at an airport, these devices work by measuring large-scale changes in the environment. But classical sensors have a limit. They are like trying to listen to a whisper in a thunderstorm—eventually, the "noise" of the world drowns out the signal.

Quantum sensors are different. Instead of looking at the "big picture," they look at individual atoms. In the quantum world, particles are so incredibly sensitive that even the tiniest change in physical properties including electric and magnetic fields, current, gravity, linear and angular acceleration timing, and light causes a measurable reaction. They don't just detect a signal; they feel it at the atomic level and that what makes them powerful. If the atom is that sensitive, it can detect things no "classical" sensor ever could.

THE UNDERLYING PHYSICS OF QUANTUM SENSITIVITY

To understand how Quantum Sensors works, we need to look at some fundamental "rules" of Quantum Mechanics.



Discrete Energy Levels : Unlike a ramp where you can stand anywhere, electrons in an atom live on a "staircase." They can only be on specific steps (energy levels). When a magnetic field or a gravitational pull touches the atom, these steps shift slightly. By measuring exactly how much energy it takes for an electron to jump from one step to another, we can measure the world with a precision that was previously impossible.

Superposition: In a classical sensor, a needle points to one value but In a quantum sensor, we put an atom into superposition—meaning it exists in two energy states simultaneously. You may think it like a spinning coin that is both heads and tails until it stops. This "spinning" state is extremely fragile. If a tiny magnetic field "whispers" to the atom, it changes the phase of the spin. When we finally measure the atom, that phase change tells us exactly how strong the field was.

Decoherence: Usually, physicists hate decoherence (when a quantum state collapses because of noise). But in sensing, decoherence is the signal!

We treat the environment as the "target." Any interaction that "disturbs" the quantum state is exactly what we want to measure. We aren't trying to keep the state alive forever (like in a computer); we are measuring how fast the environment kills the state. This makes quantum sensors the most sensitive "detectors of change" in the universe.

From Labs to the Real-life Applications

The Government of India launched the National Quantum Mission (NQM) With a significant investment of over ₹6,000 crore, the government is signaling This program explicitly includes quantum sensing and metrology as a major technology pillar. Quantum sensors are set to enhance their capabilities across multiple industries, for example; by enabling GPS-denied navigation in vehicles through quantum gyroscopes and atomic clocks, by unlocking highly accurate and accessible brain imaging through quantum magnetometers.

1. Defense (The Invisible Shield): Traditional GPS can be jammed or spoofed. But Atomic Clocks and Quantum Gyroscopes don't need satellites. They are "silent" navigators that allow our naval ships and aircraft to know their exact position within centimeters, purely by sensing the Earth's rotation and gravity.

2. Healthcare (The Micro-Scope) : We are moving toward NV-Centre Magnetometers sensors made using tiny "flaws" in diamonds). These can detect the faint magnetic pulses of your heart or brain. In the future, this could lead to wearable "caps" that monitor brain health in real-time, making high-end diagnostics accessible to every Indian village.

3. Infrastructure (Seeing Through Earth): Quantum Gravimeters can "see" through the ground. They can detect hidden tunnels, underground water reserves, or mineral deposits by sensing the slight differences in the density of the Earth. This is a game changer for India's mining and urban planning sectors.

4. Navigation Applications of Quantum Sensors : Quantum magnetometers enable magnetic-field-based navigation by matching local magnetic anomalies with reference maps, while atomic clocks ensure highly accurate timing for position determination. Together, these quantum sensing technologies enable robust, long-duration, and GPS-independent navigation for applications such as submarines, aircraft, autonomous vehicles, and deep-space missions.

India and Quantum Sensors: The Silent Backbone

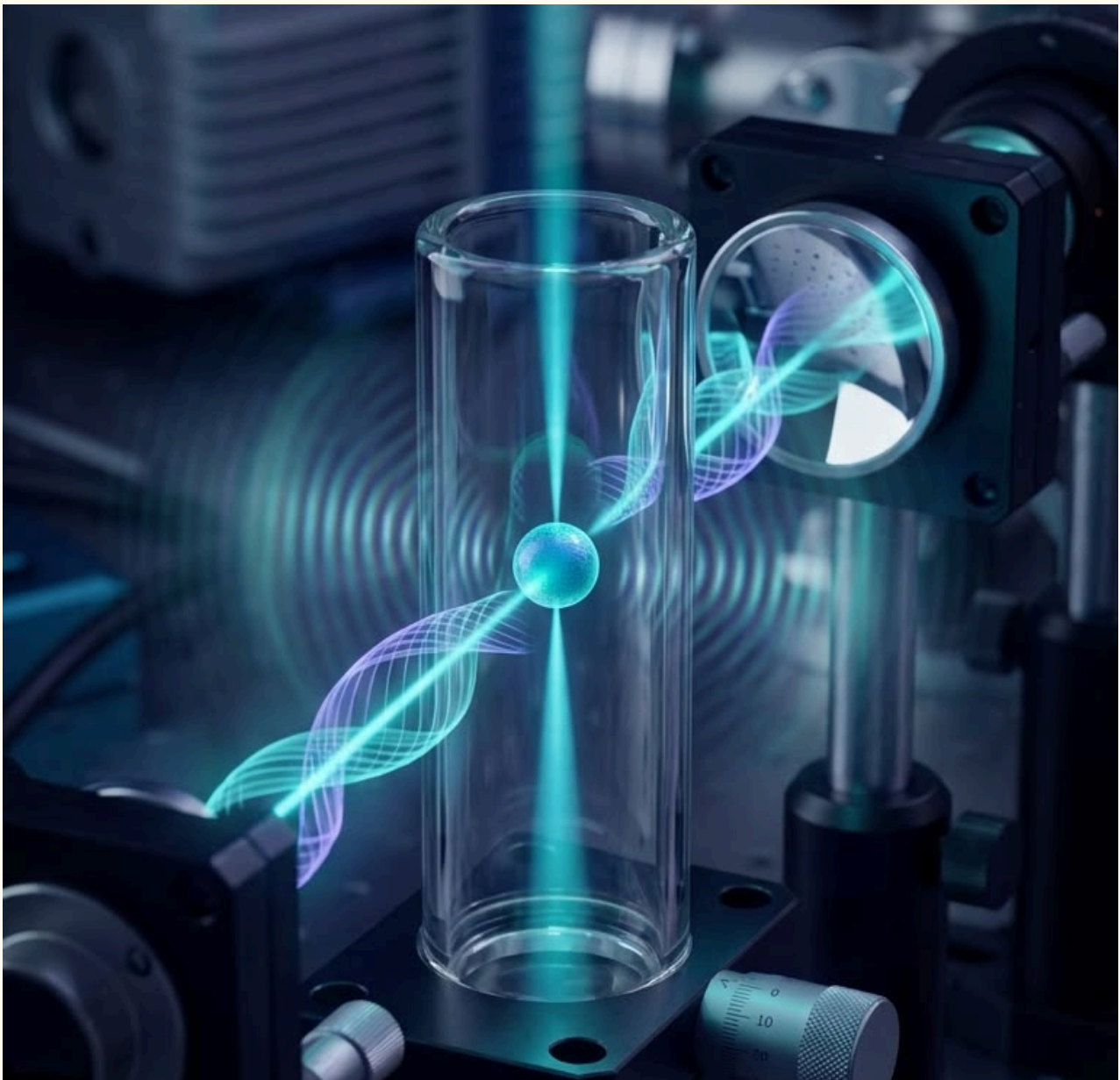
India is making significant progress in the area of quantum sensors, both at the research and strategic levels. India has already established dedicated Thematic Hubs (T-Hubs) to lead this charge. The hub at IIT Bombay is specifically focused on Quantum Sensing & Metrology through Qmet Tech Foundation. New cryogenics and quantum lab capabilities (e.g., liquid helium cryogenic systems) are being rolled out to enable low-temperature quantum experiments critical for high-precision sensors.

India is establishing quantum chip and sensor fabrication facilities at IIT Bombay and IISc Bengaluru, which support hardware development for quantum sensors and related quantum devices.

These sensors are not just laboratory curiosities anymore, It is becoming the silent backbone of India's technological sovereignty.

They are the next-generation electronic components that will redefine Indian defense, healthcare, and deep-space exploration. We are no longer just building circuits that move electrons; we are building systems that listen to them. Whether it's through the National Quantum Mission or the newly released Military Quantum Mission policy, our nation is betting on the "silent power" of the atom to secure our future.

The next time you look at a piece of electronic equipment, remember: the most powerful things in the universe aren't always the loudest. Sometimes, the greatest power is found in the quiet, precise whisper of a single atom.





HIDDEN PROTECTORS: THE SILENT SENSORS GUARDING A NATION

MISHTI ANGRASH | YEAR II

INTRODUCTION

Modern wars are fought not just with guns, but with AI, code, and silent cyber-attacks that can disable power grids and financial systems, without relying only on traditional firepower. Sensors are the devices that detect motion, heat, and signals, while embedded systems process this data to guide drones, secure borders, and enables precision strikes. By integrating sensing, processing, and action, this cycle enables instantaneous decision-making while minimizing human risks. Beyond military applications, advanced technologies empower critical sectors like healthcare, disaster management, and smart city infrastructure. However, these systems face persistent risks, including cyber threats and potential technical failures. Integrated sensors and embedded systems act as a nation's silent, invisible defenders, enhancing security, operational efficiency, and structural resilience, demonstrating that, often, the most significant power is unseen.

WHAT ARE SENSORS AND EMBEDDED SYSTEMS?

Sensors are electronic components designed to observe the environment by detecting factors like heat, motion, pressure, or signals. Embedded systems are compact processors integrated into devices to interpret this data and perform dedicated tasks. Together, they form a closed-loop system where sensors gather raw input and embedded systems convert it into meaningful actions. For instance, a temperature sensor may detect a rise in heat, and the embedded system responds by activating a cooling mechanism or sending a warning. This interaction enables automation, precision, and quick decision-making, making such systems essential in modern electronic applications.

ROLE IN DEFENCE AND CONFLICT ENVIRONMENTS

In defence environments, sensors and embedded systems play a vital role in ensuring security and precision. Along borders, motion sensors and thermal imaging systems detect unauthorized movement even in darkness or harsh conditions. Drones rely on sensors for navigation, obstacle detection, and target tracking, allowing efficient surveillance. Missile systems use advanced sensing and processing to achieve precise targeting and minimize error. Additionally, real-time data from multiple sensors enhances battlefield awareness, helping commanders make informed decisions quickly. This integration of sensing and processing technologies enables faster responses, reduces risks, and significantly strengthens the effectiveness of modern military operations.



HOW THEY ACTUALLY WORK?

The functioning of these systems follows a continuous and efficient cycle. Sensors first collect raw data from the environment, such as movement, temperature, or signals. This data is then sent to embedded systems, where it is processed and analyzed using programmed instructions. Once interpreted, the information is transmitted through communication systems to relevant units or operators. Based on this processed input, appropriate actions are taken, such as triggering an alert, adjusting system behavior, or initiating a response. This seamless flow from sensing to action enables real-time decision-making, ensuring speed, accuracy, and reliability in critical situations.



HUMAN IMPACT

The impact of sensors and embedded systems extends directly to human safety and efficiency. By handling surveillance and detection tasks, these systems reduce the need for soldiers to operate in high-risk environments, ultimately saving lives. They also minimize human error by providing accurate, real-time data, ensuring better decision-making under pressure. Remote operations become possible, allowing missions to be conducted from safer locations. Additionally, the speed at which these systems process and deliver information enables faster responses in critical situations. Together, these advantages not only improve operational effectiveness but also protect the individuals responsible for national security.



BEYOND WAR

While essential in defence, sensors and embedded systems play an equally critical role in everyday life. In disaster management, they detect seismic activity, floods, and environmental changes, enabling early warnings and reducing damage. In healthcare, ICU monitoring systems continuously track vital signs, allowing doctors to respond quickly to emergencies. Smart cities depend on sensors to control traffic, monitor pollution levels, and improve energy efficiency. This widespread use highlights their dual role—not only strengthening national security but also enhancing quality of life. These technologies prove that silent electronic systems support both survival in crises and progress in daily living.

CHALLENGES & LIMITATIONS

While highly effective, sensors and embedded systems are not without risks. Cybersecurity threats pose serious dangers, as compromised systems can lead to misinformation or control loss. Technical failures, whether due to malfunction or extreme conditions, can disrupt entire operations. The high cost and complexity of these systems also limit accessibility and scalability. Moreover, growing dependence on automation can reduce human intervention, which becomes problematic if systems fail unexpectedly. These challenges highlight the need for strong security measures, reliable design, and balanced human oversight to ensure that such technologies remain assets rather than potential liabilities.

CONCLUSION

In today's technology-driven world, the true strength of a nation lies not only in visible power but in the invisible systems that support it. Sensors and embedded systems act as the eyes and ears of modern defence, constantly monitoring, analyzing, and responding to their surroundings. Their ability to operate silently yet effectively makes them indispensable in ensuring security, precision, and efficiency. While they remain hidden from view, their impact is undeniable. Ultimately, it is these unseen electronic systems that form the backbone of national strength, proving that real power often lies in what works quietly behind the scenes.



India's Defence Backthrough: ROLE OF MODERN ELECTRONICS

KUMARI RISHIKA | YEAR II

In today's era of advanced warfare, national security depends not only on manpower and weapons but largely on modern electronic technologies. Electronics has become the backbone of India's defence system, enabling effective surveillance, secure communication, accurate weapon guidance, and rapid decision-making. From radars guarding national borders to satellites monitoring strategic regions, electronics ensures continuous situational awareness and operational superiority. Indigenous efforts by organizations such as DRDO, ISRO, and BEL have strengthened India's self-reliance in defence electronics under the Atmanirbhar Bharat initiative. As threats evolve across land, sea, air, space, and cyberspace, modern electronics plays a decisive role in safeguarding India's sovereignty and national security.

BRAHMOS SUPERSONIC CRUISE MISSILE



The BrahMos cruise missile is a supersonic weapon developed through a strategic partnership between India and Russia. Known for its incredible speed, reaching Mach 2.8 to 3.0, the BrahMos is one of the fastest missiles in the world. The missile's guidance system combines inertial navigation, satellite navigation, and active radar homing, which together ensure high accuracy, even in complex electronic warfare environments.

ASTRA MK-1 AIR-TO-AIR MISSILE

The Astra missile is a modern beyond-visual-range air-to-air missile, in service since 2019, and used by both the IAF and Indian Navy. The Astra Mk-1, measuring 3.84 meters in length, 178 millimeters in diameter, and weighing 154 kilograms, carries a high-explosive pre-fragmented warhead of 15 kilograms and is equipped with a radio proximity fuze.

The missile's success relies heavily on advanced electronics, including an Inertial Navigation System (INS) combined with mid-course data-link guidance from the launch aircraft. Astra Mk-1 exemplifies India's growing expertise in radar, guidance, and embedded electronics in modern defence systems.

ARJUN MK-1A MAIN BATTLE TANK

The Arjun Main Battle Tank (MBT) is an indigenous third generation tank developed by DRDO for the Indian Army.

One of the most important electronic features of the Arjun tank is its Fire Control System (FCS). The tank is equipped with an advanced computerized fire-control system that integrates a laser range finder, ballistic computer, and sensors to ensure high first-round hit probability.

Overall, the Arjun MBT highlights India's growing strength in defence electronics, sensors, and embedded systems.



CONCLUSION

The rapid advancement of modern electronics has transformed India's defence system into a technologically advanced and strategically strong force. As discussed in this article, the selected defence equipments clearly demonstrate how electronics plays a decisive role in surveillance, communication, precision targeting, and battlefield management. The integration of sensors, radars, guidance systems, and embedded computers has reduced dependence on manual intervention and increased operational accuracy. In the future, emerging technologies such as artificial intelligence, advanced radar systems, cyber defence, and autonomous platforms will further redefine modern warfare. Thus, electronics will continue to remain the backbone of India's defence breakthroughs.

TINY CHIPS, MIGHTY MISSION: THE TECH BEHIND OPERATION SINDOOR

RAJ NANDAN | YEAR II

INTRODUCTION

In modern warfare, power is no longer measured only by missiles and manpower—but by microchips.

During Operation Sindoor, advanced electronic chips played a crucial behind-the-scenes role. Embedded inside drones, surveillance systems, communication devices, and precision weapons, these tiny components became the backbone of the mission's success.



ROLE OF MICROCHIPS IN OPERATIONS

From real-time tracking to encrypted communication, chips enabled secure data transfer between ground forces and command centres. Smart processors analysed battlefield inputs instantly, helping commanders make faster and more accurate decisions. Navigation chips ensured drones and guided equipment stayed on course—even in hostile environments.

What makes these chips remarkable is their speed, accuracy, and reliability under extreme conditions. Despite heat, pressure, and interference, they continued to function without failure—proving that small technology can carry massive responsibility.

SILENT CONTRIBUTION ON THE BATTLEFIELD

In Operation Sindoor, while soldiers stood on the frontlines, electronic chips worked silently in the shadows—processing, protecting, and powering every move. In today's defence era, victory doesn't just march forward.

It's calculated—one chip at a time.

ADVANCING TECHNOLOGY IN DEFENCE

Modern defence operations increasingly depend on the seamless integration of hardware and software, where chips act as the brain behind every intelligent system. These microchips are designed to handle complex computations in real time, enabling systems to respond instantly to changing battlefield conditions. Whether it is identifying potential threats, coordinating multiple units, or maintaining secure communication channels, their role remains critical and irreplaceable. Moreover, the advancement of semiconductor technology has made these chips more compact, energy-efficient, and powerful than ever before. This allows military systems to operate for longer durations without failure, even in remote or high-risk environments. The ability to process vast amounts of data quickly ensures that decision-making is not only faster but also more precise, reducing the chances of human error.

FUTURE OUTLOOK

As technology continues to evolve, the importance of these tiny components will only grow stronger. Future missions will rely even more on intelligent systems, where microchips will continue to guide, protect, and strengthen defence operations—quietly shaping outcomes without ever being seen. In the coming years, developments in artificial intelligence, edge computing, and advanced semiconductor design will further enhance the capabilities of defence systems. These innovations will not only improve efficiency but also ensure greater adaptability in unpredictable situations, making modern warfare more technology-driven than ever before.



ELECTRONICS: THE SILENT POWER BEHIND A STRONG NATION”

SAKSHI KUMARI | YEAR II

A strong nation does not always show its power through noise or display. Much of its real strength works quietly in the background—inside silicon chips, along copper tracks, and within tiny processors that never rest. Electronics may not be visible, but it shapes how a nation protects itself, grows, and makes decisions every day.

In defence, electronics act like the nation’s nervous system. Radar, surveillance systems, missile guidance, and secure communication networks depend on fast signal processing and embedded control. Decisions made in fractions of a second—measured in nanoseconds and millivolts—can determine safety, accuracy, and response. Here, electronics is not just technology; it is responsibility.

In space technology, electronics works where humans cannot. Specially designed circuits and fault-tolerant systems allow satellites and spacecraft to survive extreme temperatures, radiation, and the vacuum of space. Whether helping us navigate, communicate, or study the Earth, each satellite is a carefully engineered electronic system orbiting silently above us. In healthcare, electronics connects human care with machine precision. Devices such as ECG machines, MRI scanners, ventilators, and wearable sensors convert biological signals into meaningful data. Through amplification, filtering, and digital processing, doctors gain clarity that helps them diagnose earlier and treat better. Across infrastructure and smart cities, electronics brings efficiency and balance. Smart grids manage energy, traffic systems reduce congestion, and sensor networks respond to real-time conditions. Cities become more responsive, not by chance, but through embedded intelligence.

ELECTRONICS DOES NOT ASK FOR ATTENTION. IT SIMPLY WORKS—CONSTANTLY, QUIETLY, RELIABLY. AND IN DOING SO, IT SUSTAINS THE STRENGTH OF A NATION.

WAR WITHOUT BORDERS: THE AGE OF CYBER WARFARE

Rachit Singh | Year II



Tiny digital units known as data, which function as the atoms of this digital world, now define the world we live in instead of physical matter. Data is present everywhere, even in areas we don't seem to care about. In the wrong hands, this information might tell a lot about a person. In order to choose the ideal moment to launch an attack, nations look for patterns, behaviors, and everyday routines.

Cyber warfare represents this new mode of conflict, where battles are no longer fought on physical land but in digital spaces. It involves the use of digital attacks to disrupt, damage, or gain unauthorized access to critical systems and important databases of a nation. These systems include military networks, communication channels, financial systems, and essential infrastructure such as power grids and transport systems.

Unlike traditional warfare, cyber attacks are silent, fast, and may happen right under your nose. They do not require physical presence, yet they can cause large-scale disruption within a blink of your eye. This makes cyber warfare one of the most powerful tools in modern defence strategies.

The capacity of cyberwarfare to have an influence without causing physical destruction is one of its main advantages. Countries can gather intelligence, take down hostile systems, and halt activities without engaging in direct combat; a massive military force marching across half of the globe is not necessary to disrupt an adversary's resources. This lessens the possibility of imminent human casualties and the necessity for widespread troop deployment.

But there are also significant hazards and difficulties associated with cyberwarfare. Confusion and geopolitical friction between countries frequently result from the inability to pinpoint the true source of an assault due to unclear attribution. Attacks may occasionally target civilian systems including banks, hospitals, and communication networks, resulting in extensive disruption that goes beyond military goals.

As not all attacks are carried out by nations, history has recorded several major cyber incidents conducted by individual hackers or organized groups to disrupt national systems. For example, the WannaCry ransomware attack (2017) affected computer systems across hospitals, businesses, and government networks worldwide, causing massive disruption. Another example is the Stuxnet worm, which targeted Iran's nuclear facilities and is considered one of the most advanced cyber weapons ever discovered.

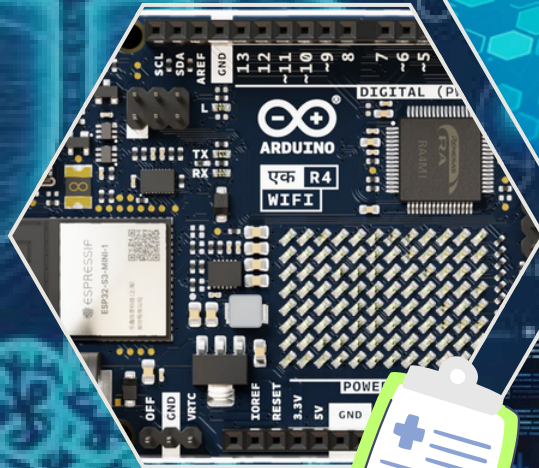
In conclusion, countries are now more susceptible than ever due to their growing reliance on digital infrastructure. A single successful cyberattack has the capacity to completely shut down vital systems, demonstrating how pervasive technology has become in both everyday life and national security. The nature of conflict has changed as a result of cyberwarfare, moving from visible battlefields to invisible networks. technology presents new dangers that are challenging to manage even as technology provides strategic advantages in intelligence, speed, and efficiency. Cybersecurity will play an equally important role in safeguarding nations as traditional military might as the world grows increasingly digitally connected.

DEPARTMENT OF ELECTRONICS

CREATIVE
CORNER



ADITI PANT [YEAR I]



Healthcare

THE HIDDEN ELECTRONICS BEHIND MODERN DRONES

ELECTRONICS: THE SILENT POWER BEHIND A STRONG NATION



NOT JUST MACHINES.
NETWORKS OF INTELLIGENCE.

Mishti Angirash [Year II]



Voltage Of Valor

They are not soldiers in the field, but guardians that our modern world must yield. Their watch is kept through code and wire, with focused thought and deep desire.

When the call of duty rings so bright, these minds resolve to stand and fight. In every drone and data stream, they realize a patriot's dream.

They link our homes, they guard our shores, through innovation's open doors. In hidden labs, their quiet deeds plant the strong and future seeds.

No parade will shout their name, yet in our progress burns their flame. So here's to minds that work and weave the silent strength in which we believe.

by Raj Nandan [Year 11]



DEPARTMENT OF ELECTRONICS

DEPARTMENT
ACTIVITIES

EVENTS SESSION

2025-26

It has been an incredibly active and exciting session for the department! We went beyond the regular classroom lectures to bring our students real-world exposure, hands-on skills, and a chance to truly explore their creative and technical sides.

Here is a quick look back at all the fantastic events we organised this year:

DEPARTMENT ORIENTATION

The orientation programme was designed to give freshers a warm welcome and help them settle in. We walked them through the curriculum, introduced them to our faculty members, and gave them a tour of the laboratories. It was a great way to show them all the research and extracurricular opportunities waiting for them, helping them start their college journey with absolute clarity and excitement.

FICCI SESSION ON INNOVATION & ENTREPRENEURSHIP

Date: 7th August 2025



The Federation of Indian Chambers of Commerce and Industry (FICCI) invited our faculty and students to a session focused on entrepreneurship and industry growth. The talk gave students a broader perspective on the Indian business landscape and highlighted why academia and industry need to work together to drive technological innovation. It was an inspiring session for students looking to eventually build their own startups and got a chance to meet business leaders.

STUDENT IMPRESSION

The summit successfully highlighted the growing importance of skill development in a rapidly changing global economy. It created a collaborative environment where stakeholders from different sectors could exchange ideas and propose solutions. The presence of government representatives and industry experts added credibility and depth to the discussions.

INDUSTRY-ACADEMIA INTERACTIVE SESSION

Date: 12th August 2025

To bridge the gap between textbook theories and actual industrial practices, we hosted a highly interactive session with industry experts. The guest speakers shared valuable insights into the latest tech trends, upcoming career opportunities, and the exact skill sets companies are looking for today. The students really opened up during the Q&A round, asking great questions and getting a much-needed reality check on what the professional world expects from them.

INDUSTRIAL VISIT TO SEMICON

Date: 3rd September 2025

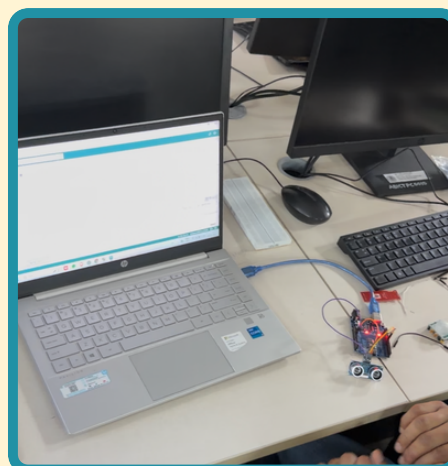
To give our students a closer look at the backbone of modern electronics, we visited Semicon 2025. Walking through the facility, students got to see the semiconductor manufacturing process up close and its market. It was a fantastic opportunity for them to understand the sheer scale of the semiconductor ecosystem and why it plays such a critical role in today's global tech infrastructure.



HANDS-ON IOT WORKSHOP

Date: 6th February 2026

The Internet of Things is taking over, and we wanted our students to be right at the forefront! We organised a purely practical, hands-on workshop where participants got to play around with microcontrollers, sensors, and wireless communication modules. Instead of just listening to a lecture, students built actual mini-projects, learning how IoT is used in everyday scenarios like water level monitors and smart home automation.



AMPLIFIER 2026 - DEPARTMENT FEST

Date: 16th February 2026

This was undoubtedly one of the highlights of our calendar!

Our Department proudly hosted Amplifier 2026, our flagship technical fest. Started with a seminar on the topic Chips, Code & Combat: How Semiconductors share modern warfare by guest speaker Dr. Anu Sharma, from Amity University.

The campus was buzzing with energy as students competed in a variety of events designed to test their innovation and problem-solving skills:

- **FutureLink IoT:** In this hands-on team challenge, students put their heads together to build, code, and showcase their very own functional IoT models and smart solutions.
- **Tech Tank:** A competitive stage that challenged students to step up and pitch their most creative and forward-thinking technological innovations to the audience.
- **Circuit Hunt:** An exhilarating challenge that put students' analytical skills to the test as they solve complex puzzles to collect hidden components and piece together a working circuit.



PCB SCULPTURES IOT WORKSHOP

Date: 27th February 2026

The Department had organized PCB Sculptors: A KiCad Design Lab, as part of National Science Day celebrations. The workshop introduced students to the fundamentals of printed circuit board design. Participants learned how to convert circuit ideas into practical PCB layouts using KiCad, covering schematic creation, footprint selection, component placement, and track routing. The session was designed to be beginner-friendly, allowing students from all backgrounds to follow along. By the end, attendees gained hands-on experience by designing their own PCB layouts, making the workshop both informative and engaging.



HANDS-ON DRONE WORKSHOP

Date: 27th February 2026

Taking our tech enthusiasm to the skies, we conducted an exciting drone workshop. Attendees understood the physics and mechanics of unmanned aerial systems from scratch. Our students who completed a project recently under SriVipra with their mentor broke down everything from basic drone components and flight dynamics to how these machines and AI can combine and how they are currently being used for aerial surveillance and agriculture. The live flight demonstrations were a huge hit and gave everyone a practical understanding of this booming technology.



DEPARTMENT OF ELECTRONICS

SRI-VIPRA
PROJECTS

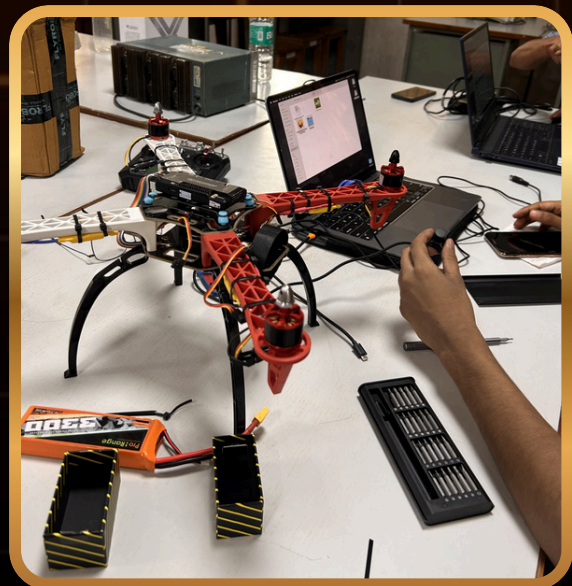
SRI VIPRA PROJECTS

SRIVIPRA Projects at Sri Venkateswara College highlight innovation, research, and hands-on learning. These projects integrate AI, IoT, and smart electronic systems to solve real-world problems through intelligent design and testing. The initiative provides students with practical application of theoretical concepts, encouraging experimentation, prototyping, and system development. By working on live projects, students gain experience in fault detection, automation, predictive monitoring, and adaptive technologies. SRIVIPRA nurtures creativity, technical skills, and problem-solving abilities, preparing learners to contribute to modern engineering challenges while promoting innovation-driven education and industry-ready expertise.

INTELLIGENT QUADCOPTER DRONE FOR SURVEILLANCE APPLICATION

MENTOR : DR. RAHUL **MEMBERS**

- Akshara Bhatt
- Anurag Goswami
- Deepika
- Devansh Sawney
- Diya Sharma
- Samarth
- Samuel Matthews
- Sana Singh



This research focuses on developing an intelligent quadcopter drone for surveillance applications. It integrates drone technology with artificial intelligence and computer vision to enable real-time aerial monitoring, object detection, and data analysis.

The project aims to improve security, monitoring efficiency, and coverage in areas such as disaster management, border security, and surveillance.

This report presents the design, development, and implementation of an Intelligent Quadcopter Drone for Surveillance Applications. It explains the working principles of the quadcopter system, including the integration of the flight controller, sensors, camera module, and communication system. The report also discusses the use of artificial intelligence and computer vision techniques for real-time monitoring and object detection.

To evaluate the performance of the system, several test flights were conducted in controlled environments. During testing, the drone's stability, flight control response, video transmission quality, and object detection capability were analyzed. The results demonstrated that the quadcopter can perform surveillance tasks effectively while maintaining stable flight and reliable data transmission.

The Intelligent Quadcopter Drone demonstrates the potential of combining drone technology with artificial intelligence for efficient surveillance. It enables real-time monitoring, improved security, and faster response in applications like disaster management and security.

MULTI-SENSOR QUADCOPTER SYSTEM

MENTOR : DR. RAKHI NARANG

MEMBERS

- Rudra Pandey
- Vartika
- Shivam Kumar
- Nitesh
- Riddhi Verma
- Sarvesh Kumar
- Sakshi Kumari
- Vineesha Singh
- Jayant Issar
- Rishabh
- Akshay Tiwari
- Swayam Arora

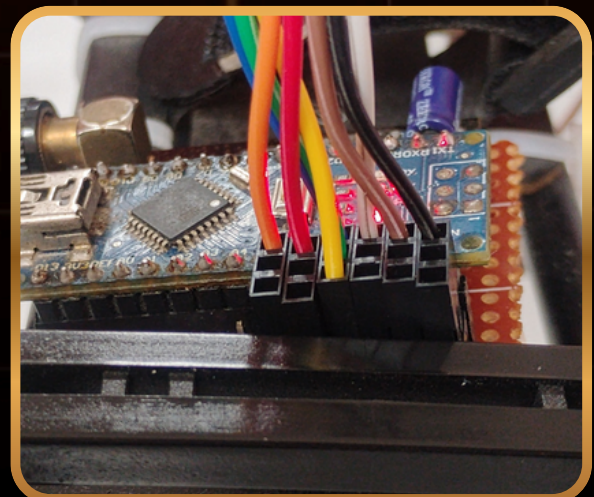
The research focused on developing a stable and intelligent quadcopter system by integrating multiple sensors for accurate flight control and navigation. The objective was to overcome the limitations of single-sensor drones by combining data from an inertial measurement unit (IMU), GPS module, barometer, and compass.

These sensors work together to provide real-time information about altitude, orientation, speed, and position.

The system uses a flight controller with advanced filtering techniques to process sensor data and reduce noise, ensuring smooth and reliable performance. Special attention was given to sensor calibration, PID tuning, and communication reliability to achieve better flight stability. The research also explored waypoint navigation, altitude hold, and position hold features to make the quadcopter more autonomous. Hardware-in-the-loop testing and real-time flight trials were conducted to validate system performance. The overall aim was to design a multi-sensor quadcopter capable of stable flight, precise navigation, and adaptive response to environmental disturbances.

The Multi-Sensor Quadcopter System is designed to improve drone stability and control using sensor fusion technology. The quadcopter integrates MPU-based IMU, GPS, barometer, and compass modules with a flight controller to continuously monitor motion and position. The processed data allows the drone to maintain altitude, hold position, and follow predefined waypoints. A custom 2.4 GHz communication system ensures smooth command transmission between the transmitter and the quadcopter. The development involved component selection, hardware integration, programming, calibration, and flight testing. PID tuning helped achieve balanced and responsive control. The system demonstrated reliable flight performance and the ability to operate in real-time conditions with improved accuracy and stability.

The multi-sensor quadcopter demonstrates how sensor fusion enhances drone stability, navigation, and reliability. The project successfully achieved controlled flight, autonomous features, and real-time responsiveness, making it suitable for surveillance, monitoring, and intelligent aerial applications.



SMART-SENSE LIVING: AN ADAPTIVE IOT CONTROL PROTOTYPE

MENTOR : DR. HARI SINGH

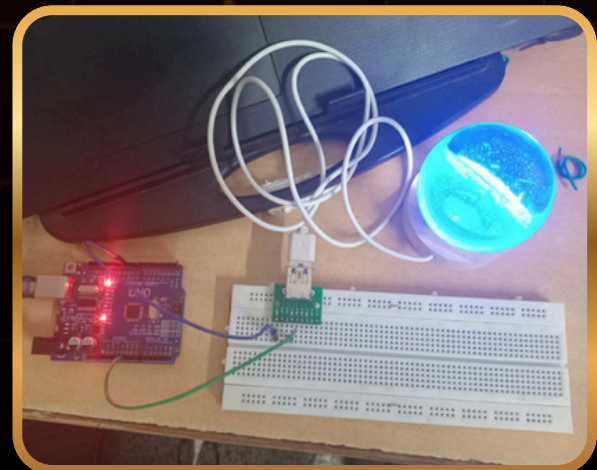
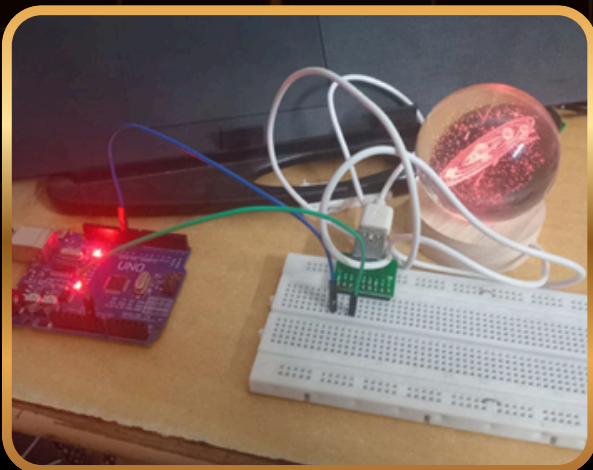
MEMBERS

- Mishti Angirash
- Rachit Singh
- Harshit Gupta

The research focused on creating a smart and adaptive home automation system using IoT and gesture recognition. It studies how traditional switches and voice commands can be replaced with touchless interaction methods. The system uses computer vision to detect hand gestures and convert them into control signals. It also emphasizes accessibility, making the system useful in noisy environments and for users with speech difficulties. The research integrates software tools like Python and hardware components like Arduino to build a cost-effective and efficient solution for modern smart homes.

Smart Sense Living is a gesture-based IoT control system that allows users to operate appliances without physical contact. A camera captures hand gestures, which are processed using OpenCV and MediaPipe. The commands are then sent to an Arduino to control devices like lights. The system is fast, reliable, and user-friendly, offering a modern alternative to traditional home automation methods.

Smart Sense Living presents a practical step toward future-ready homes by enabling touchless, intuitive control. It enhances accessibility, efficiency, and user comfort, making home automation smarter, more inclusive, and aligned with evolving human-technology interaction.



DEPARTMENT OF ELECTRONICS

THEN
VS
NOW



“WAR HAS EVOLVED”

OLD MILITARY SYSTEMS VS AI-DRIVEN DEFENSE

FROM FIREPOWER TO INTELLIGENCE



TRADITIONAL WARFARE

- RELIES ON MANUAL CONTROL & HUMAN DECISION-MAKING
- LIMITED BY VISIBILITY, SPEED, AND COMMUNICATION DELAYS
- HEAVY DEPENDENCE ON PHYSICAL STRENGTH AND FIREPOWER

THEN



AI-DRIVEN DEFENSE

- USES REAL-TIME DATA, SENSORS & AUTOMATION
- ENABLES PRECISION TARGETING AND FASTER RESPONSE
- INTEGRATES DRONES, SATELLITES & CYBER SYSTEMS

NOW

MODERN DEFENSE ISN'T LOUDER—IT'S SMARTER.

MANUAL MANUFACTURING VS INDUSTRY 4.0

INDUSTRY REIMAGINED

MANUAL MANUFACTURING

- LABOR-INTENSIVE AND TIME-CONSUMING PROCESSES
- DEPENDENT ON HUMAN PRECISION AND CONSISTENCY
- LIMITED SCALABILITY AND HIGHER ERROR RATES

INDUSTRY 4.0

- DRIVEN BY AUTOMATION, ROBOTICS & IOT SYSTEMS
- ENABLES REAL-TIME MONITORING AND SMART DECISIONS
- HIGH EFFICIENCY WITH MINIMAL HUMAN INTERVENTION

THEN

NOW

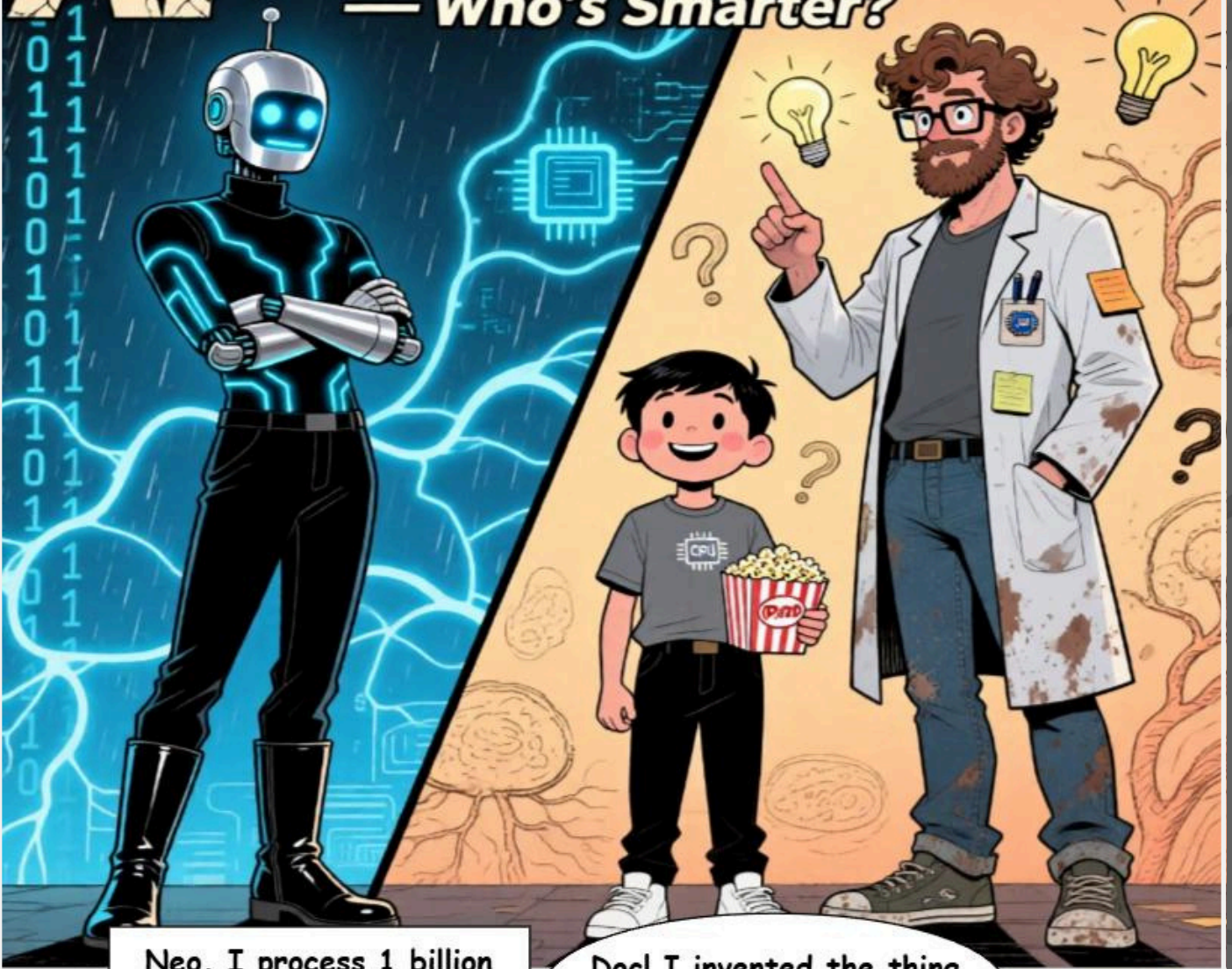
“EFFICIENCY IS NO LONGER HUMAN-LIMITED.”

DEPARTMENT OF ELECTRONICS

COMIC
SECTION

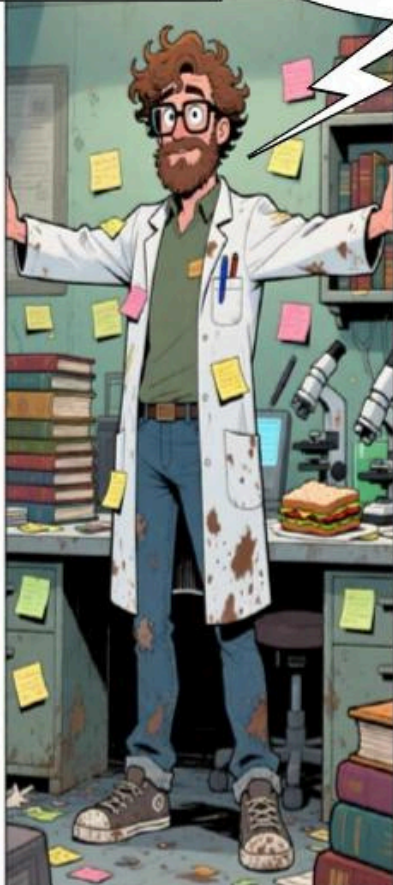


AI vs Human Brain — Who's Smarter?



Neo. I process 1 billion operations per second.

Doc! I invented the thing that made YOU possible.



Chip. I just watch these two argue. It's my cardio

BATTLE OF THE BRAINS

THIS WILL BE QUICK. I ALREADY KNOW THE ANSWER."

TONIGHT'S QUESTION — WHO IS TRULY SMARTER?

I SOLVED YOUR ENTIRE PHD THESIS IN 0.003 SECONDS.

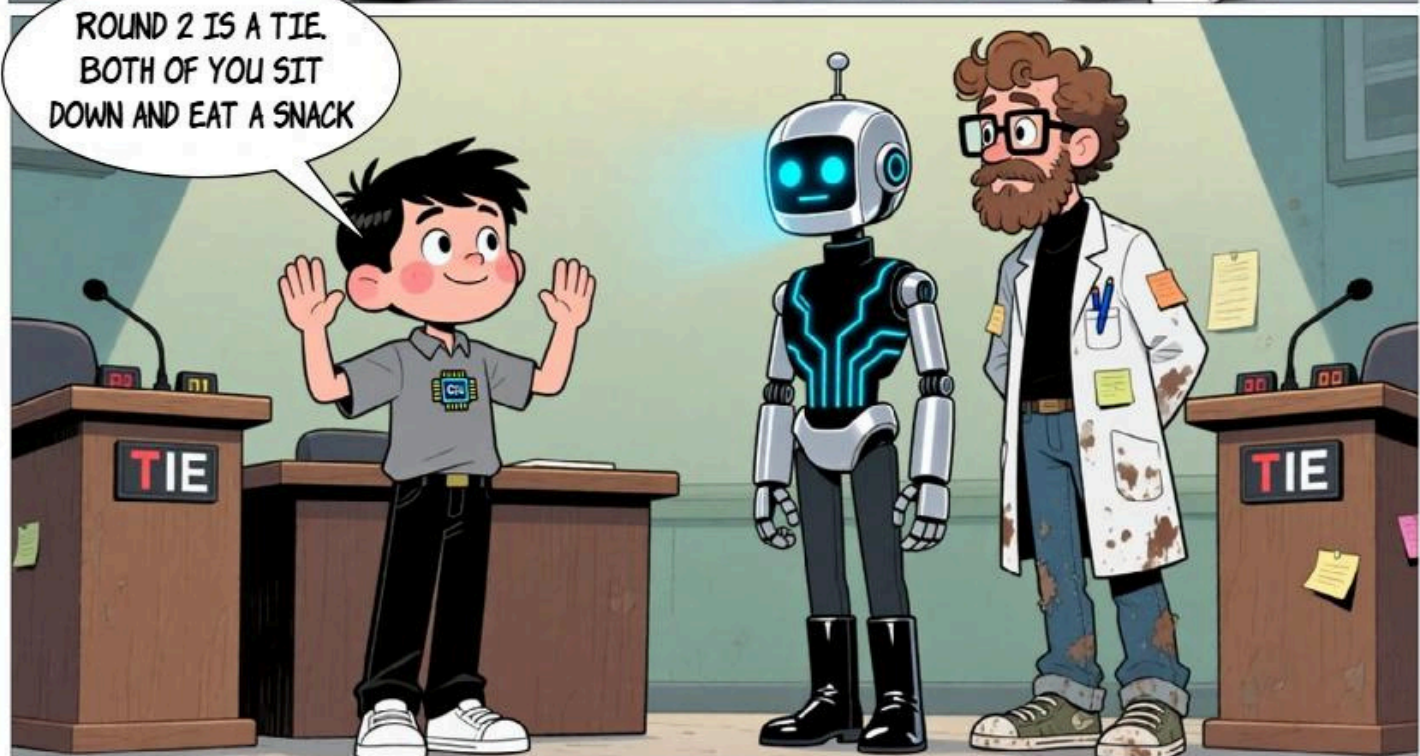
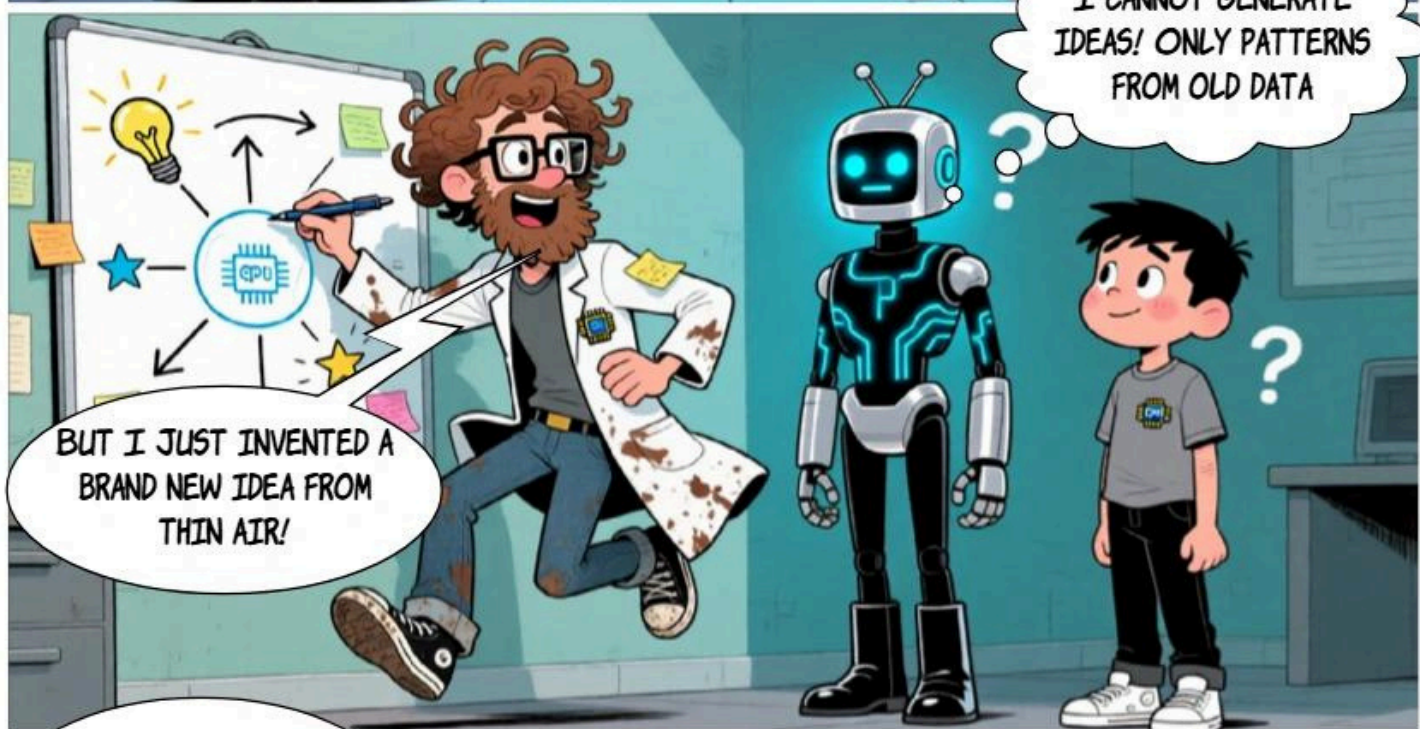
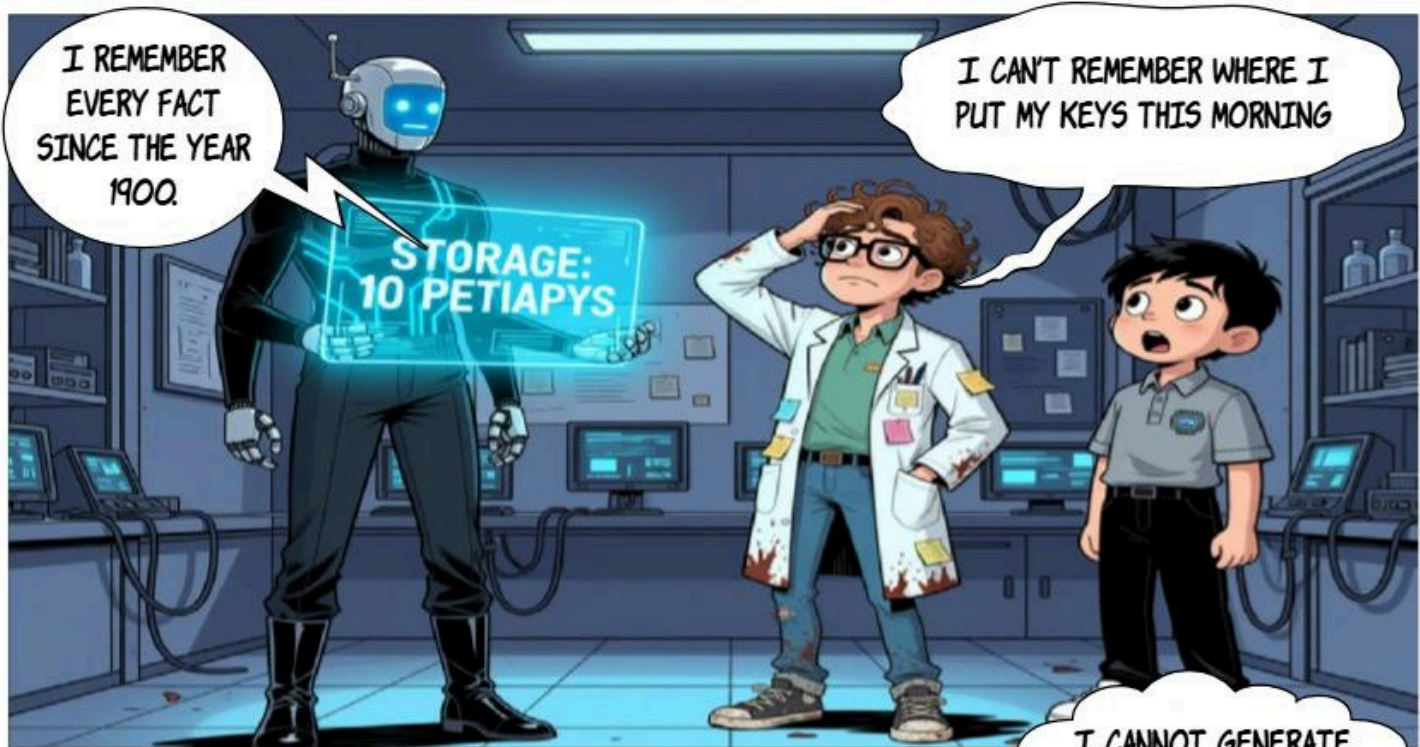
...I SPENT 6 YEARS ON THAT!

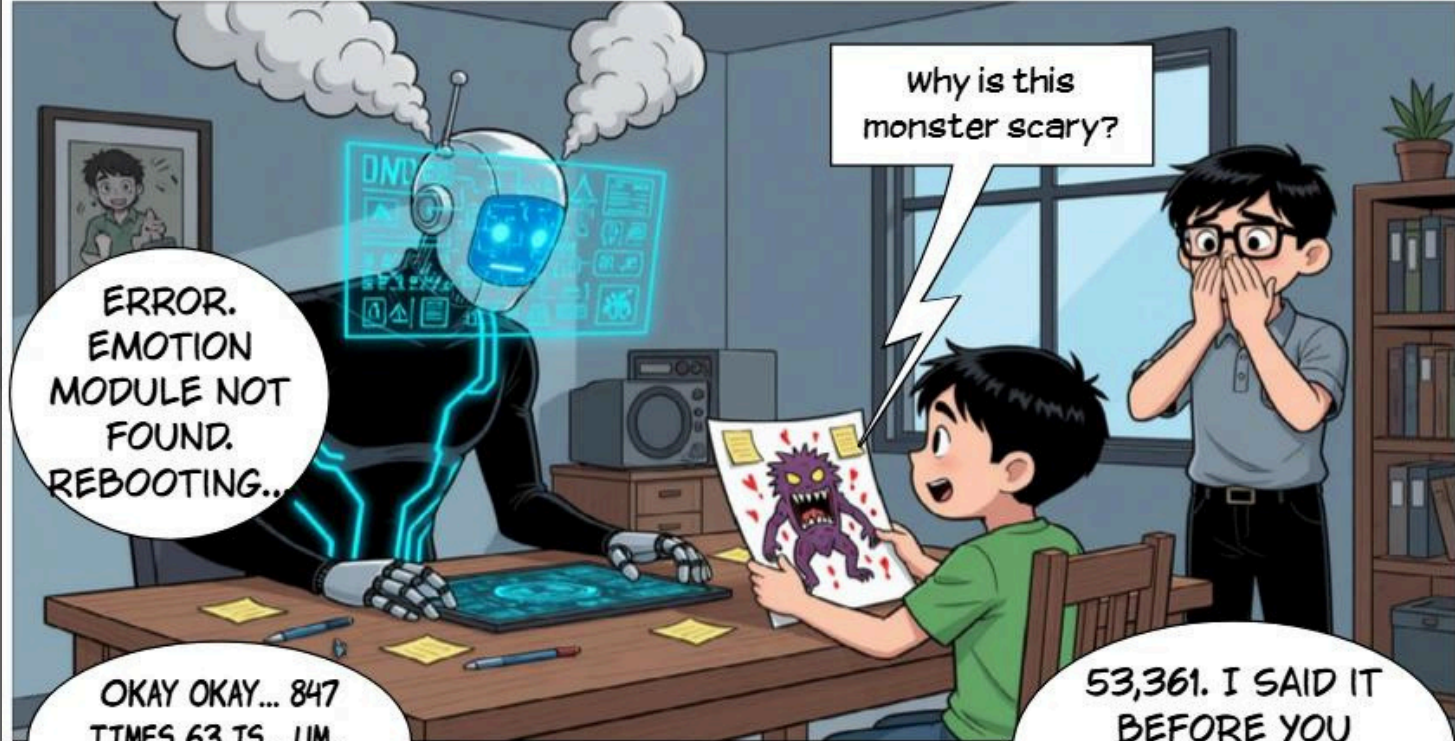
CALCULATIONS PER SECOND:
1,000,000,000.

PROCESSING... IMAGE QUALITY:
12%. NO USEFUL DATA FOUND.

CAN YOU FEEL WHAT THIS MEANS? MY DAUGHTER DREW IT.





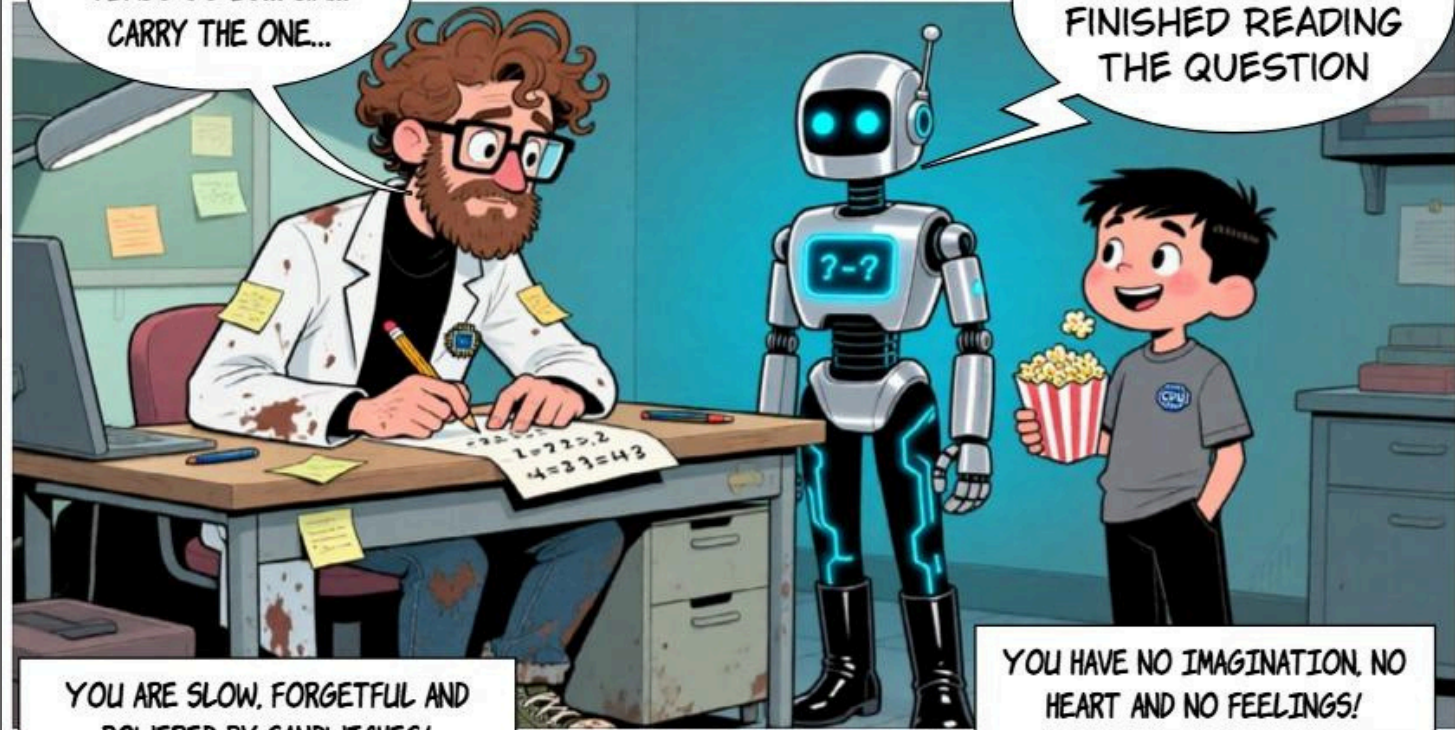


Why is this monster scary?

ERROR. EMOTION MODULE NOT FOUND. REBOOTING...

OKAY OKAY... 847 TIMES 63 IS... UM... CARRY THE ONE...

53,361. I SAID IT BEFORE YOU FINISHED READING THE QUESTION



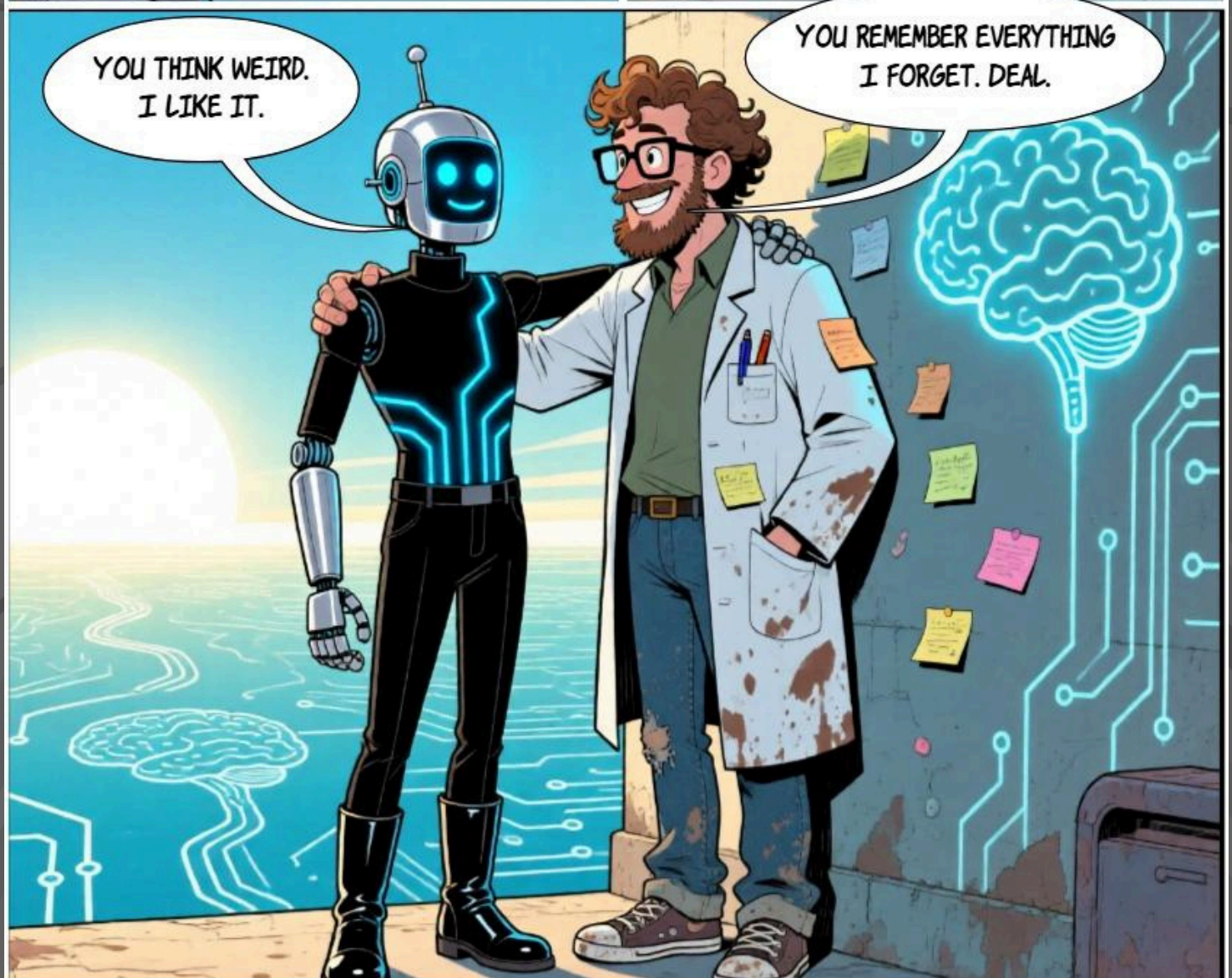
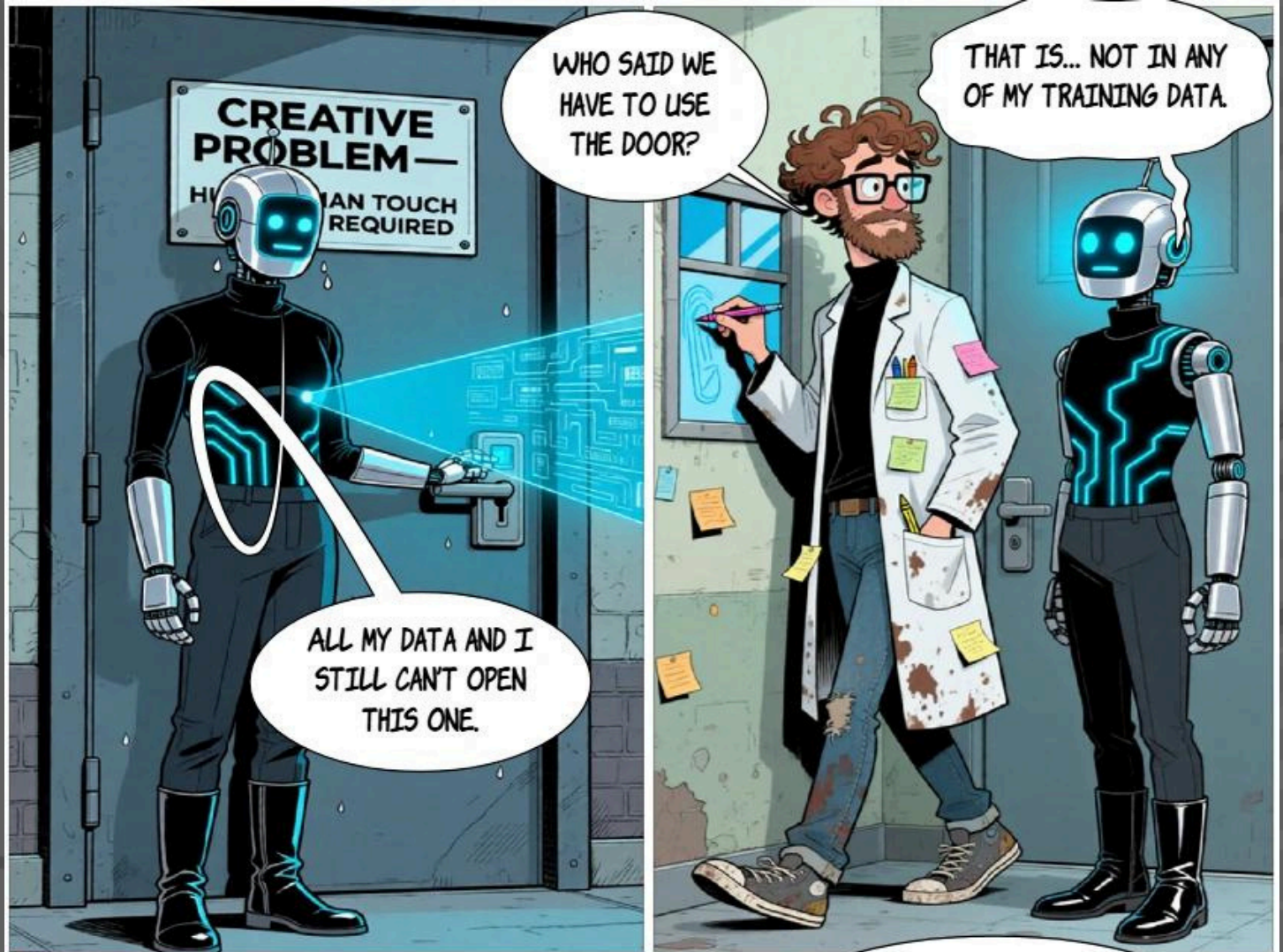
YOU ARE SLOW, FORGETFUL AND POWERED BY SANDWICHES!

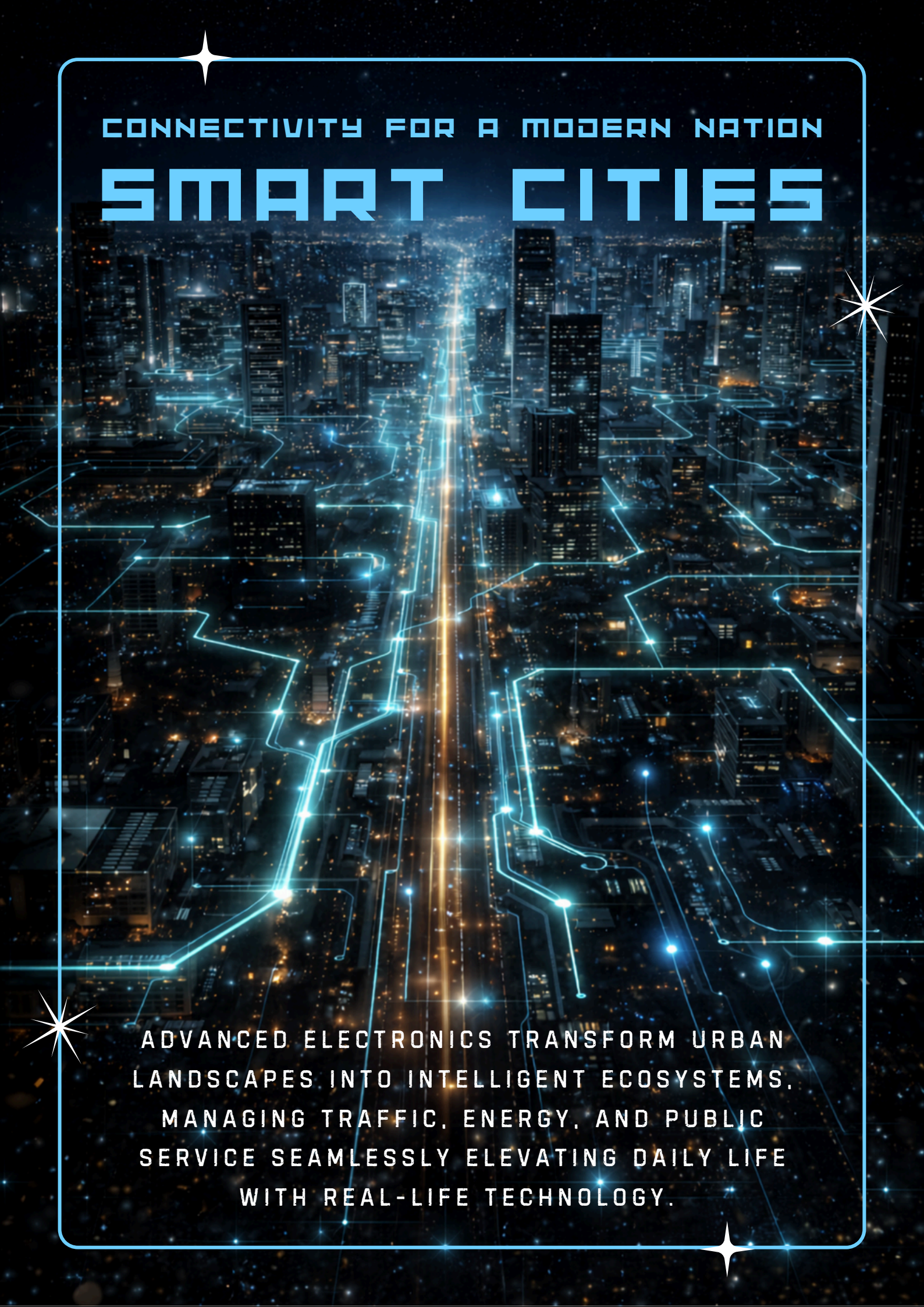
YOU HAVE NO IMAGINATION, NO HEART AND NO FEELINGS!



YOU ARE SLOW, FORGETFUL AND POWERED BY SANDWICHES!

WHY THEY BOO THERAPY





CONNECTIVITY FOR A MODERN NATION

SMART CITIES

ADVANCED ELECTRONICS TRANSFORM URBAN
LANDSCAPES INTO INTELLIGENT ECOSYSTEMS,
MANAGING TRAFFIC, ENERGY, AND PUBLIC
SERVICE SEAMLESSLY ELEVATING DAILY LIFE
WITH REAL-LIFE TECHNOLOGY.

DEPARTMENT OF ELECTRONICS

STUDENT
GALLERY





15TH YEAR



END YEAR



3RD YEAR



4TH YEAR

ELECTRONICS
THE SILENT
POWER BEHIND
A STRONG NATION



AANVTK '26

