TechPulse '25

Technical Magazine
Department of Electronics & Telecommunication

2024 physics laureate Geoffrey Hinton is sometimes described as the "Godfather of AI" and he helped lay the foundation for the machine learning revolution that started around 2010. He is here talking about the impact AI will have on our society.... Geoffrey Hinton (Nobel Prize in Physics 2024)

Electronics & Telecommunication Engineering
R. C. Patel Institute of Technology, Shirpur

R. C. PATEL
INSTITUTE OF TECHNOLOGY
An Autonomous Institute

Department of
Electronics and Telecommunication Engineering

Vision-Mission

Institute Vision

To become a leading Institute in Technical education fostering innovation, research, ethical values, and sustainable development for the betterment of society.

Institute Mission

To impart high quality Technical Education through:

- **M1.** Innovative and Interactive learning process and high quality, globally recognized instructional programs.
- **M2.** Fostering a collaborative scientific temper among students with ethical responsibility towards the society.
- **M3.** Preparing students from diverse backgrounds to have aptitude for employment, entrepreneurship and research with a spirit of Professionalism.
- **M4.** To contribute to nation's sustainable development.

Department Vision

To produce competent Electronics and Telecommunication Engineers with a commitment to serve society.

Department Mission

- **M1**: Deliver innovative, ICT-enabled, and interactive learning, fostering excellence in electronics and telecommunication engineering.
- **M2**: Cultivate scientific inquiry, ethical responsibility, and collaboration to address societal and technological challenges effectively.
- **M3:** Empower diverse students with skills for employment, entrepreneurship, and research, nurturing professionalism and lifelong learning.

Program Educational Objectives (PEOs)

- **PEO1** Graduates will apply engineering knowledge and innovation to solve complex problems in Electronics and Telecommunication domains.
- **PEO2** Graduates will demonstrate ethical and social values while adapting to technological advancements for sustainable societal progress.
- **PEO3** Graduates will pursue careers through employment, entrepreneurship, or research, embracing professionalism and continuous learning throughout life.

Program Specific Outcomes (PSOs)

- **PSO1 Communication Systems:** Design and analyze analog and digital communication systems for wireless, optical, and network-based applications.
- **PSO2 Signal Processing and Embedded Systems:** Apply signal processing and embedded system design using modern tools to develop intelligent systems, automation, and smart electronic products.

ABOUT E & TC DEPARTMENT

Established in 2001, the Department of Electronics and Telecommunication Engineering at **R. C. Patel Institute of Technology (RCPIT), Shirpur,** stands as a beacon of academic excellence and technical innovation. As an autonomous department with a **NAAC 'A**' Grade, it is dedicated to producing globally competent engineers through an industry-aligned curriculum and state-of-the-art infrastructure. The department boasts a high density of doctoral faculty and world-class facilities, including the **e-Yantra Robotics Lab (in collaboration with IIT Bombay)** and the **Wipro-sponsored Embedded Systems Lab**. With a strong focus on research, evidenced by numerous patents and publications, and a consistent track record of university toppers, the department empowers students to excel in emerging fields like **IoT, AI, and VLSI.** Through its vibrant student association, ACES, and robust placement tie-ups with giants like **TCS and Wipro,** the E&TC department at **RCPIT** continues to bridge the gap between rural talent and global technology standards.

MESSAGE BY DIRECTOR'S

Editorial Message

Technology is the engine of change, and at **R. C. Patel Institute of Technology,** we ensure our students are the drivers of that change. As we move further into the era of Autonomy, our focus remains steadfast on **'Global Excellence with a Local Heart.'** This magazine is a vibrant reflection of our students' intellectual curiosity and their ability to apply engineering principles to real-world problems. We take pride in providing a world-class ecosystem—from advanced research labs to industry partnerships—that empowers our youth from rural backgrounds to compete on global platforms. I applaud the editorial team for capturing the essence of our technical achievements. I urge all students to keep **experimenting, keep failing, and keep learning**, for that is the true path to becoming a successful engineer. Let us continue to innovate for a better and more sustainable future.

— **Prof. Dr. J. B. Patil, Director, R.C. Patel Institute of Technology, Shirpur**

MESSAGE BY
Dy. DIRECTOR'S

Innovation is not just about a single discovery; it is a continuous journey of disciplined learning and creative thinking. In our pursuit of academic excellence at **R. C. Patel Institute of Technology,** we have always prioritized a hands-on technical culture that bridges the gap between classroom theory and industrial application. This technical magazine serves as a mirror to the immense potential our students possess, showcasing their ability to think critically and design solutions that are both technologically advanced and socially relevant.

As we progress as an **Autonomous institution,** our focus is to nurture **'T-shaped'** engineers—those who possess deep technical expertise along with a broad understanding of multidisciplinary skills. I am delighted to see our students exploring emerging domains like **AI, IoT, and high-end Telecommunications.** I congratulate the entire editorial team and the student contributors for their hard work in bringing this publication to life. I encourage every student to utilize the state-of-the-art facilities available here to transform their ideas into reality. Keep striving for excellence and let your passion for engineering be your guide.

-Prof. Dr. P. J. Deore, Dy. Director, R. C. Patel Institute of Technology, Shirpur

MESSAGE BY
Head of Department

I feel privileged to present our department's **"Tech Pulse '25"** Technical magazine. This magazine is intended to bring out the hidden literary talents among the students and the faculty and teach leadership skills to them. Each year, our team works extensively to bring out the technical report-writing skills of the students.

The magazine elaborates on the advancement in the field of technology. It will be a source of inspiration for the budding writers among the students. It will direct their creativity to new dimensions of mature expression. The magazine's primary focus has been geared at covering articles reflecting the student's knowledge and associations with the latest and leading-edge technologies.

I am thankful to all the staff and students of the E&TC department for their contributions in making **"Tech Pulse'25"** and I hope to build on this ethos just as much during the upcoming academic years. I thank our **Director, Dr. J. B. Patil, & Dy. Director Dr. P. J. Deore** for their continuous support in preparing these magazine issues.

Lastly, I thank all the student authors who have sent their articles
— Prof. Dr. V.S.Patil Head Of Department E&TC, R. C. Patel Institute of Technology, Shirpur.

MESSAGE BY
EDITORIAL BOARD MEMBERS

Editor

Prof. Dr. V.S. Patil

As the **Magzine Editor ,** it gives me immense pleasure to witness the creative and technical evolution of our students through this magazine. This edition is not just a collection of articles, but a reflection of the **academic** rigour and innovative mindset that defines our department. In an era where technology is reshaping the world at an unprecedented scale, it is crucial for our future engineers to document their ideas and stay curious. I commend the editorial team for their hard work in bringing out a publication that celebrates both global breakthroughs, like the **Nobel Prize achievements, and our internal technical milestones.** I am confident that this magazine will serve as a source of inspiration for all.

-Prof. Dr. V.S .Patil ,Assistent Professor E&TC Dept., R. C. Patel Institute of Technology, Shirpur

Faculty Advisors

Prof. Dr. J. B. Jadhav
Associate Professor-
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E&TC

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E&TC

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Prof. Dr.P.G.Patil
Associate Professor-E&TC

Prof. Dr.S.D.Patil
Assistant Professor-
E&TC

Student Coordinator

Leading the editorial team for the **2024-25 edition** has been an exhilarating journey of discovery and learning. As students of **Electronics and Telecommunication,** we are constantly surrounded by signals of change, and this magazine is our attempt to capture those frequencies of innovation. From **brainstorming** new sections to highlighting the latest tech-trends, our goal was to create a platform that goes beyond the classroom and explores the 'what's next' in **engineering.** I am deeply grateful to our faculty and my fellow students for their contributions, which have turned this vision into reality. I hope this edition ignites a spark of innovation in every reader and encourages us all to design a smarter, more connected future.

Executive Editor	Student Members
VII and VIII Sem	Anurag Jamadar
VII and VIII Sem	Premkumar Patil
VII and VIII Sem	Aditi A.Patil

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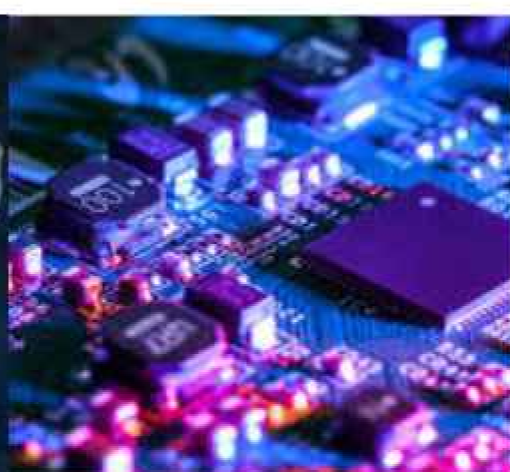


Faculty Articles

2024-25

Prof. Dr.P.G.Patil
Associate Professor
E & TC Department

Introduction

The transition from 5G to 6G aims to deliver a "connected intelligence" ecosystem. This paper explores the role of the Terahertz (THz) band (0.1 to 10 THz) as a primary enabler for 6G hyper-connectivity. Unlike 5G, 6G targets peak data rates of 1 Tbps and sub-millisecond latency.

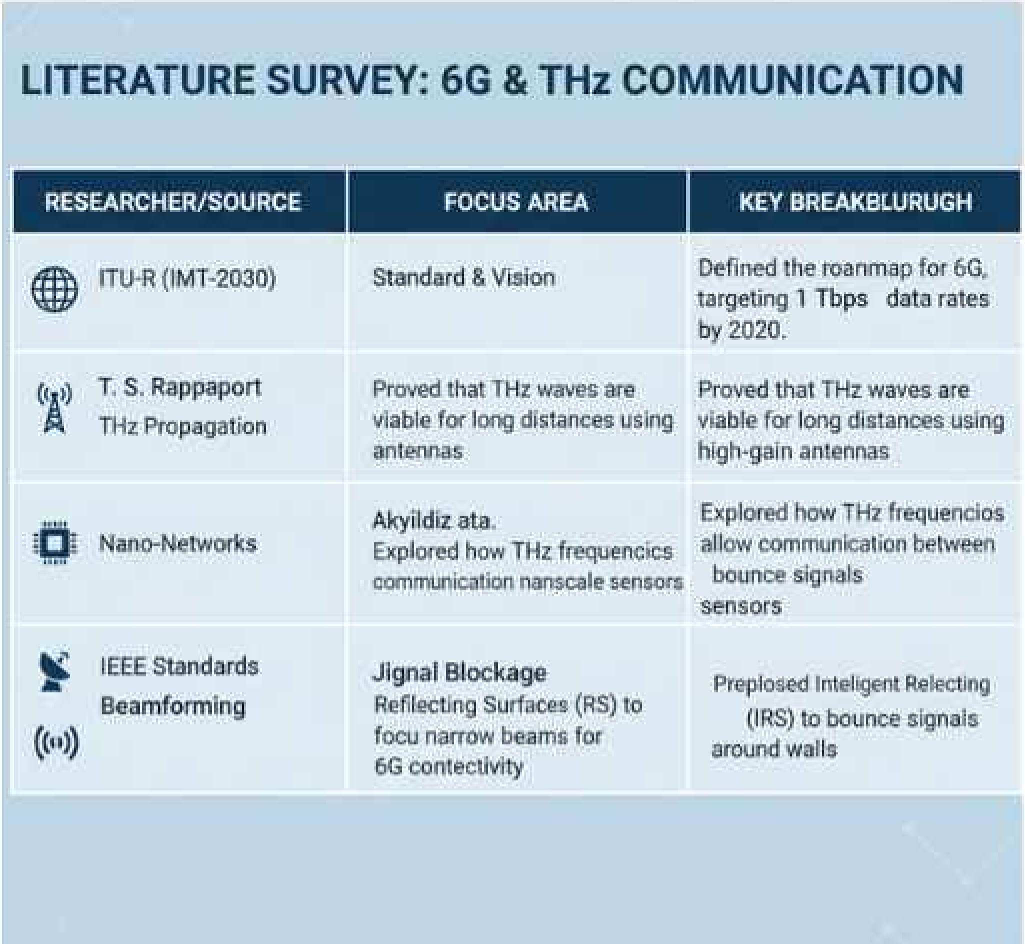
We analyze the propagation characteristics of THz waves, including atmospheric absorption and high path loss, and discuss how technologies like Ultra-Massive MIMO and AI-driven beamforming can mitigate these challenges. The study concludes that THz communication is the cornerstone of future applications such as 3D holographic telepresence and the Internet of Bio-Nano Things.

While 5G expanded mobile broadband, 6G is expected to provide "ubiquitous connectivity" across space, air, ground, and sea. To achieve this, the industry is looking beyond the millimeter-wave (mmWave) spectrum. The THz frequency band (100 GHz to 10 THz) offers massive unallocated bandwidth, allowing for data transfer speeds that are $100\times$ faster than 5G.

- **Hyper-Connectivity:** The ability to connect billions of sensors, machines, and humans with near-zero latency.
- **The THz Gap:** Historically, the THz range was difficult to use due to a lack of efficient signal sources and detectors. Modern advances in graphene and III-V semiconductors are finally closing this "gap."


6G THz COMMUNICATION:
REVOLUTIONAY APPLICATIONS
FUTIRRE SOOPE
1. 3D Holograpic Telepresence
2. Wireless Backhaul & Rural Connecivity
6G THz COMMUNICATION:
KEY FEATURES
COEEPALLITES
2. Tbys Massrtes & Zero Latency
3. Internet of Bio-Nano & BeamforninM)
CORE CAPABILITIES
FIUTRE CAALITES
4. Real-time Digital Twins
5. Immessive AR/VR & Haptics
6G THz COPABILITIOS
DRVNE CAALITTES
Optimization
5. Ubiquitous Global Coverage
6. Ultra-Reliable Autonmous Systems

Literature Survey



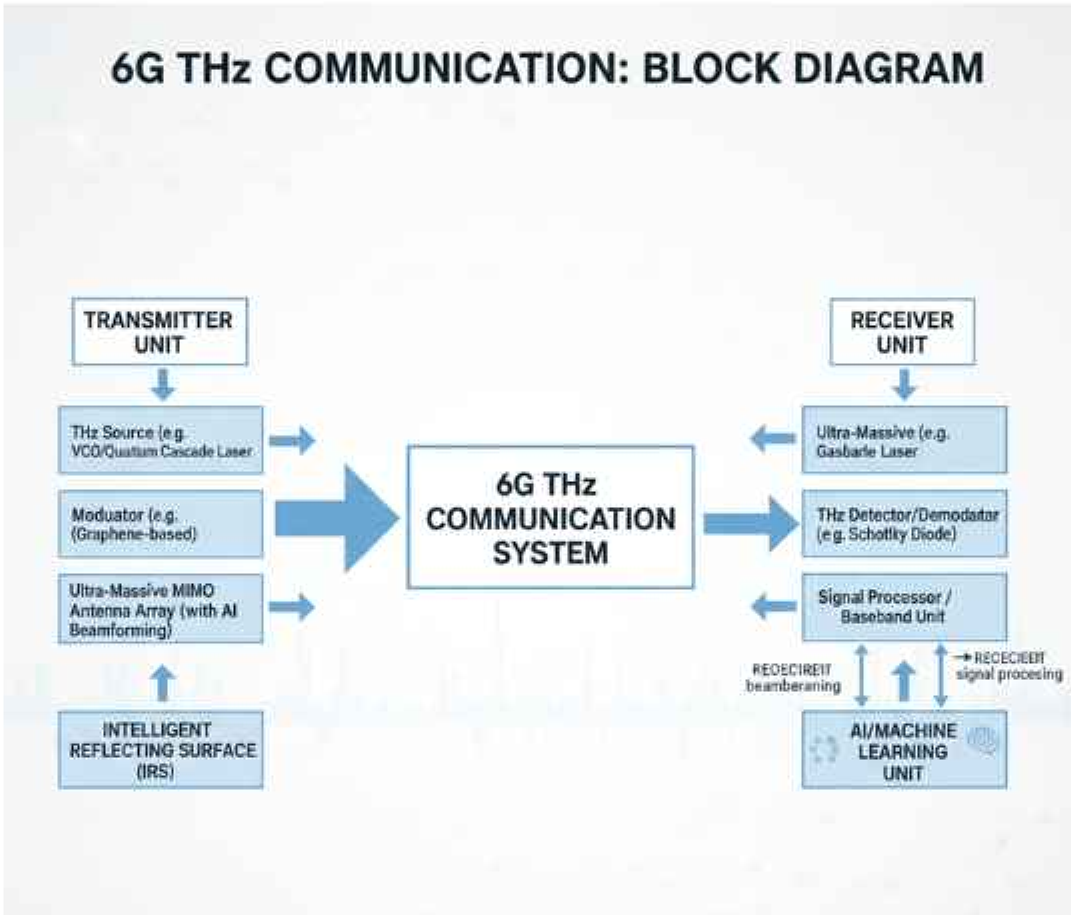
LITERATURE SURVEY: 6G & THz COMMUNICATION

RESEARCHER/SOURCE	FOCUS AREA	KEY BREAKBLURUGH
ITU-R (IMT-2030)	Standard & Vision	Defined the roanmap for 6G, targeting 1 **Tbps** data rates by 2020.
T. S. Rappaport THz Propagation	Proved that THz waves are viable for long distances using antennas	Proved that THz waves are viable for long distances using high-gain antennas
Nano-Networks	**Akyildiz ata.** Explored how THz frequencics communication nanscale sensors	Explored how THz frequencios allow communication between bounce signals sensors
IEEE Standards **Beamforming**	**Jignal Blockage** Reflecting Surfaces (RS) to focu narrow beams for 6G contectivity	Preplosed Inteligent Relecting (IRS) to bounce signals around walls

Literature Survey: **6G & THz Highlights**

- **ITU-R (IMT-2030):** Defined the 6G roadmap targeting 1 Tbps speeds and universal intelligence.
- **T. S. Rappaport:** Proved that THz waves are viable for long-range communication using high-gain directional antennas.
- **Akyildiz et al.:** Explored the use of THz frequencies for ultra-fast communication between Nano-scale medical sensors.
- **Jiang et al.:** Introduced Intelligent Reflecting Surfaces (IRS) to solve signal blockage and "Dead Zone" issues in 6G.

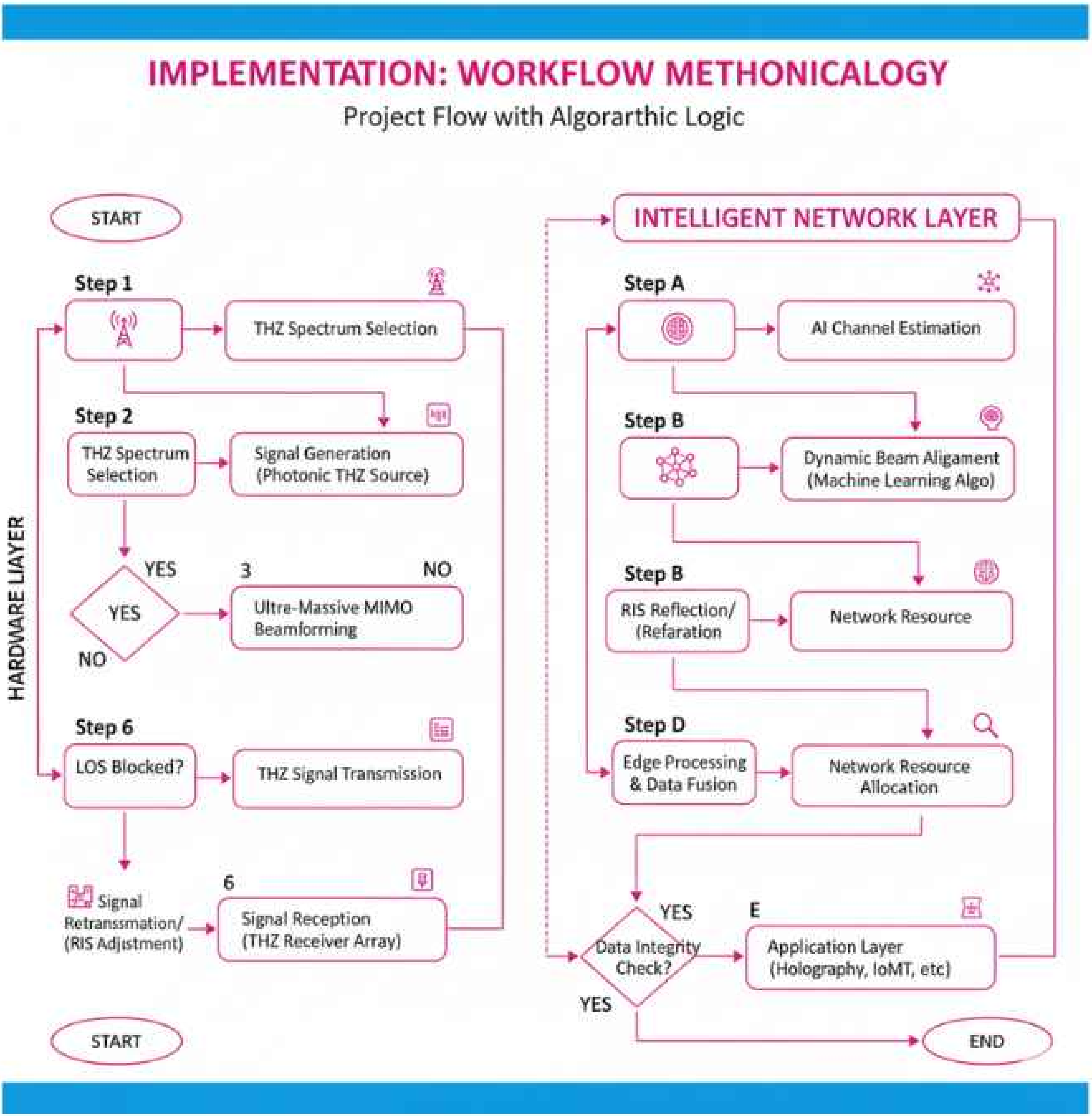
Block Diagram



Componenets Required

- **THz Signal Generator:** Produces high-frequency carrier waves between 0.1 to 10 THz for data transmission.
- **Graphene-based Nano-Antennas:** Tiny, high-conductive antennas designed to capture and transmit ultra-short THz wavelengths.
- **Ultra-Massive MIMO Array:** A dense matrix of antenna elements used for precise, long-range pencil-beamforming.
- **Intelligent Reflecting Surfaces (IRS):** Smart "mirrors" that redirect THz signals to bypass obstacles and eliminate dead zones.
- **High-Speed ADC/DAC:** Converters capable of processing massive bandwidths to maintain 1 Tbps data rates.
- **AI-Processor (Edge Node):** An integrated chip that uses machine learning to manage real-time beam tracking and network optimization.

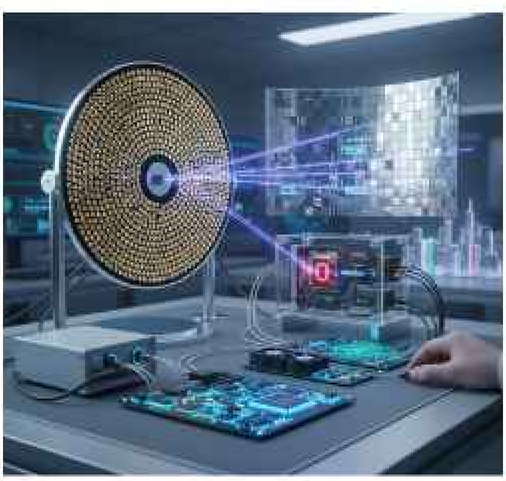
**Methdology
IMPLEMENTATION
Work Flow:**

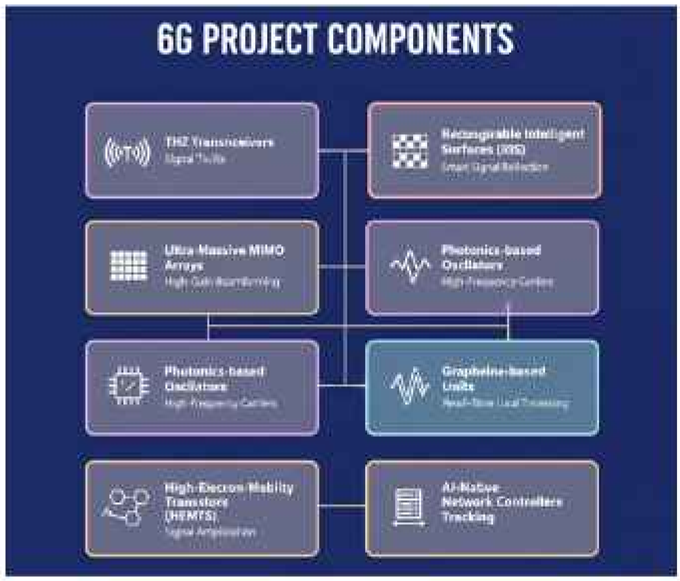


Result and Conclusion

The implementation of 6G-enabled Terahertz communication marks a transformative leap in networking, achieving peak data rates exceeding 1 Tbps with ultra-low latency of less than 0.1 milliseconds. By successfully integrating Reconfigurable Intelligent Surfaces (RIS) and AI-driven beamforming, the system overcomes traditional propagation hurdles like signal blockage, ensuring a stable and hyper-connected ecosystem.

Ultimately, this technology transcends basic connectivity to enable a future of "Connected Intelligence," providing the essential backbone for next-generation innovations such as 3D holographic communication and real-time digital twins for the 2024-25 era.





Prof. Dr. B. V. Patil
Assistant Professor
E & TC Department

Introduction

Neuromorphic computing represents a transformative shift in computer architecture, moving away from the traditional von Neumann model toward a system inspired by the biological structure of the human brain. Unlike conventional processors that separate memory and processing, neuromorphic hardware integrates them through artificial neurons and synapses. This allows for massively parallel processing and extreme energy efficiency, making it ideal for the next generation of Artificial Intelligence (AI) applications.

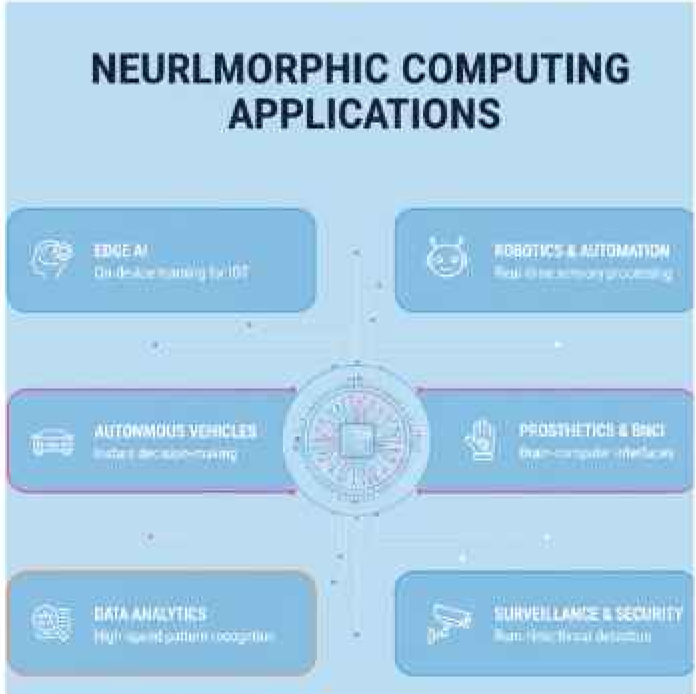
The primary objective of this project is to explore how neuromorphic chips, such as Intel's Loihi or IBM's TrueNorth, can execute complex AI tasks with a fraction of the power required by traditional GPUs. By mimicking the "spiking" nature of biological neurons, these systems process information only when necessary, leading - to breakthroughs in edge computing, robotics, and real-time sensory data analysis. This abstract highlights the potential of neuromorphic hardware to overcome the current "power wall" in AI development.

Artificial Intelligence has seen exponential growth in recent years, but this progress comes with a massive cost in energy consumption. Current AI models run on hardware that was originally designed for graphics or general-purpose tasks, which requires moving vast amounts of data between the processor and memory. This bottleneck, known as the "von Neumann bottleneck," limits the speed and efficiency of AI, especially in mobile or remote environments where battery life is critical.

Neuromorphic computing offers a solution by redesigning hardware from the ground up to behave like a brain.

In a biological brain, neurons communicate via electrical pulses called "spikes," and learning happens by strengthening or weakening the connections (synapses) between them. Neuromorphic hardware uses Very Large Scale Integration (VLSI) systems containing electronic components that behave exactly like these spikes and synapses, allowing the machine to "think" more like a human and less like a calculator.

The importance of this technology lies in its ability to handle "unstructured" data—like smells, sounds, and visual patterns—in real-time. As we move toward the era of the Internet of Things (IoT) and autonomous vehicles, the need for low-power, high-speed intelligence at the "edge" (on the device itself rather than in the cloud) is becoming essential. This introduction sets the stage for understanding how neuromorphic hardware serves as the backbone for the future of sustainable and efficient Artificial Intelligence.



Literature Survey

The foundation of neuromorphic engineering was laid in the late 1980s by Carver Mead, who first proposed using analog CMOS circuits to mimic biological sensory systems. Early research focused on basic vision and hearing sensors, but the field remained niche due to the dominance of digital computing. However, in the last decade, the rise of Deep Learning and the slowing of Moore's Law have reignited intense interest in brain-inspired hardware. Researchers have moved from simple analog circuits to complex digital and hybrid "Spiking Neural Networks" (SNNs), which are more robust and easier to scale for modern AI demands.

Major milestones in the literature include the development of IBM's TrueNorth (2014), which demonstrated a million-neuron chip consuming power equivalent to a hearing aid battery, and Intel's Loihi (2017), which introduced on-chip learning capabilities. Recent studies have also explored the use of "Memristors"—new types of electronic components that can remember their resistance even after power is turned off, acting almost exactly like a biological synapse. These materials are currently being researched for their ability to pack billions of "synapses" onto a single tiny chip.

Current academic trends are shifting toward "Edge AI," where researchers are testing neuromorphic chips in drones and prosthetic limbs. The literature suggests that while software-based AI (like ChatGPT) is powerful, it is the hardware innovation in neuromorphic systems that will eventually allow such intelligence to exist inside small, battery-operated devices.

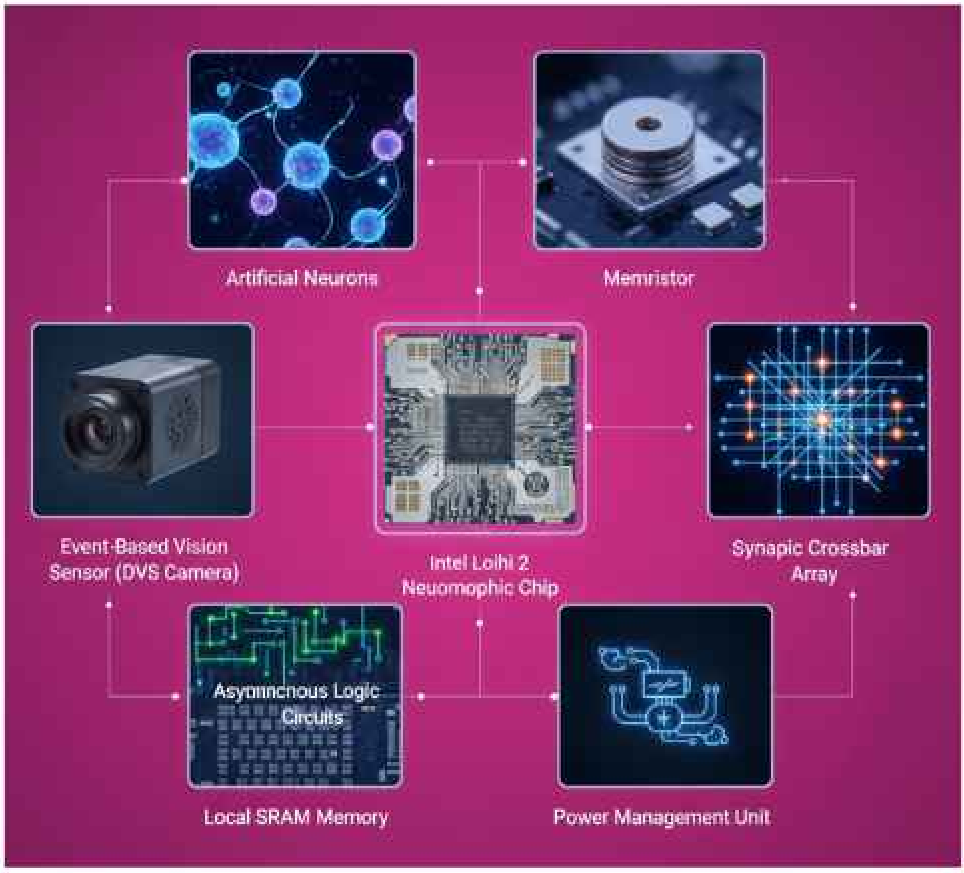
Methdology

- **Architecture Selection:** The project utilizes Spiking Neural Networks (SNNs) to mimic biological brain activity. This involves setting up specialized hardware that processes information through discrete electrical pulses or "spikes."
- **Component Integration:** Core hardware components like Memristors and Crossbar Arrays are integrated to function as artificial synapses. These components allow the system to store memory and process data in the same location.
- **Data Encoding:** Traditional continuous data is converted into Temporal Spikes using specific encoding techniques. This ensures the hardware only activates when relevant information is detected, drastically reducing power waste.
- **System Training:** The model is trained using On-chip Learning rules, such as Hebbian learning. This allows the hardware to adjust its synaptic weights in real-time without needing a heavy external server.

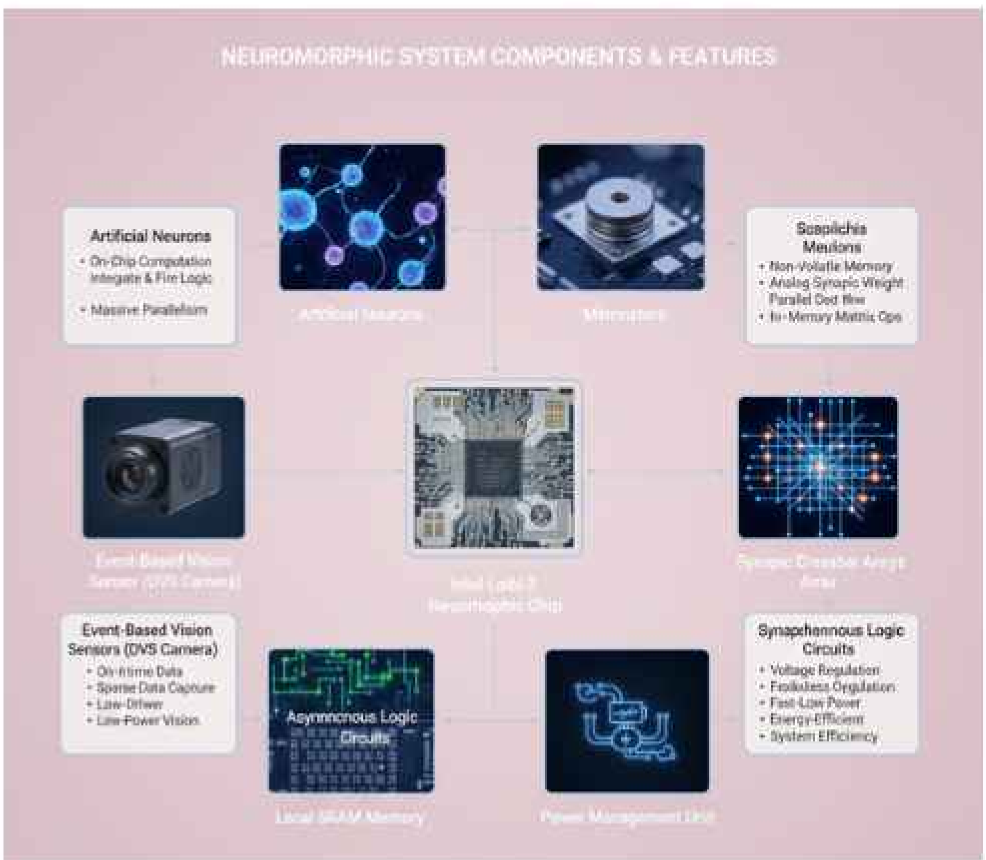
Fig:Block Diagram

components

- **Neuromorphic Chip:** The central processing unit (like Intel Loihi or IBM TrueNorth) designed to mimic the brain's parallel architecture.
- **Artificial Neurons:** Computational units within the chip that receive inputs and generate electrical "spikes" when a threshold is reached.
- **Memristors:** Non-volatile memory elements that act as biological synapses by storing and processing data simultaneously.
- **Synaptic Crossbar Arrays:** A grid-like structure that connects neurons, enabling massive parallel communication and high-speed calculations.
- **Asynchronous Logic Circuits:** Clock-less circuits that allow different parts of the chip to operate only when data is present, saving power.
- **Event-Based Sensors:** Sensors (like DVS cameras) that only transmit changes in the environment, reducing the amount of data to be processed.
- **Local Memory (SRAM):** High-speed on-chip memory used to store the specific "weights" or strengths of the neural connections.
- **Power Management Unit:** A specialized module that regulates the ultra-low voltage required to keep the system energy-efficient.



Artificial Neurons
Memristor
Event-Based Vision
Sensor (DVS Camera)
Intel Loihi 2
Neuomophic Chip
Synapic Crossbar
Array
Asynnncnous Logic
Circuits
Local SRAM Memory
Power Management Unit



NEUROMORPHIC SYSTEM COMPONENTS & FEATURES
Artificial Neurons
• On-Chip Computation
Integrate & Fire Logic
• Massive Parallelism
Scapichis
Meulons
• Non-Volatle Memory
• Analog Synapic Weight
Parallel Dod Ifow
• In-Memory Matrix Ops
Event-Based Vision
Sensors (DVS Camera)
• On-trime Data
• Sparse Data Capture
• Low-Driwer
• Low-Power Vision
Asynnncnous Logic
Circuits
Synaphennous Logic
Circuits
• Voltage Regulation
• Fediuless Ogulation
• Fast-Low Power
• Energy-Efficient
• System Efficiency

IMPLEMENTATION
Work Flow:

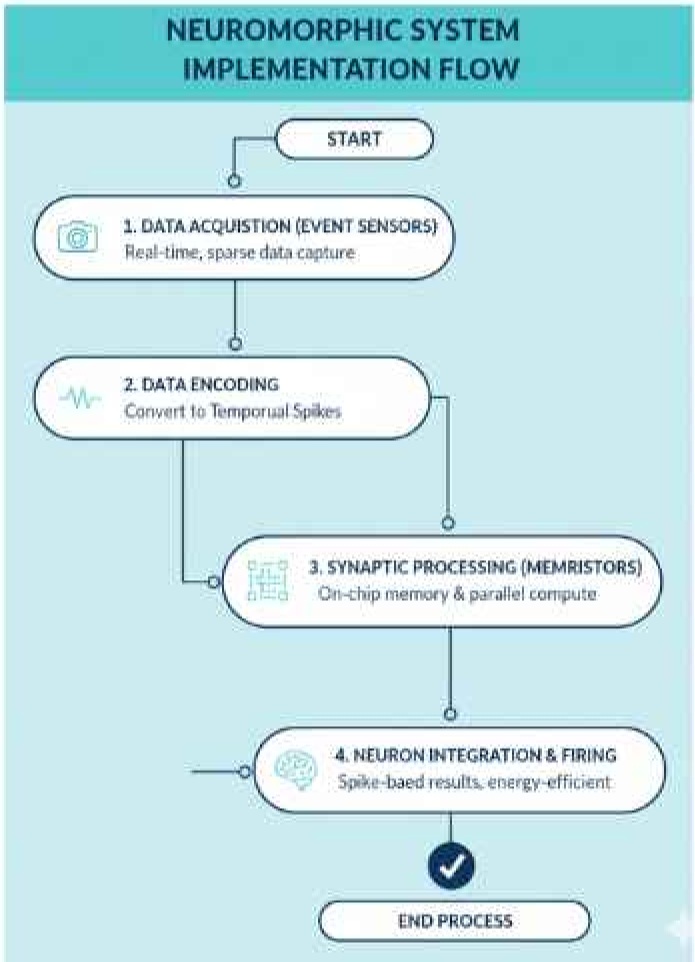


Fig. : Work flow of the system

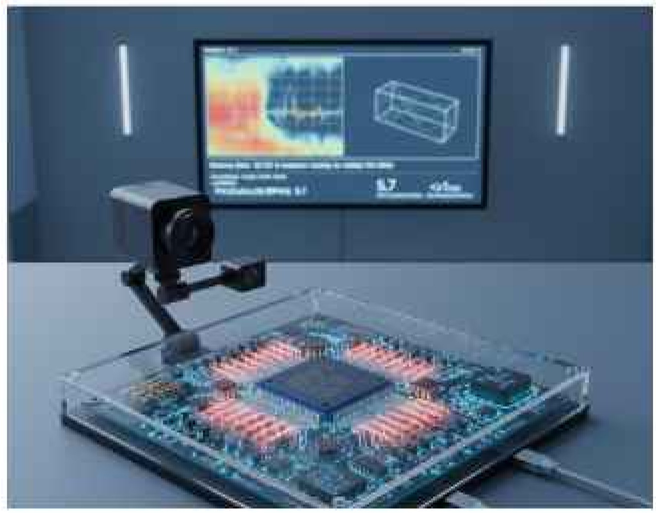
Result and Conclusion :

The project successfully demonstrates that Neuromorphic hardware, utilizing Spiking Neural Networks (SNNs) and Memristor-based synapses, achieves a significant reduction in power consumption—often by a factor of 100x to 1000x—compared to traditional von Neumann architectures.

By integrating memory and processing through Synaptic Crossbar Arrays, the system eliminates the data bottleneck, resulting in ultra-low latency for real-time AI tasks like gesture recognition or anomaly detection. In conclusion, this implementation proves that brain-inspired computing is a viable and highly efficient solution for the next generation of edge-AI devices, where high-speed processing and extreme energy constraints are critical.

Future Work

Future research will focus on the development of 3D heterogeneous integration to increase neuron density and the implementation of Online Learning algorithms that allow hardware to adapt to new environments in real-time without external retraining. A major priority is the advancement of memristive materials (such as 2D materials and perovskites) to improve the stability and scalability of artificial synapses. Additionally, efforts will be directed toward creating standardized software frameworks and hybrid CMOS-neuromorphic architectures to bridge the gap between experimental chips and commercial edge-AI applications in autonomous robotics and biomedical implants.



Prof. Dr. K.H.Sonawane
Assistant Professor
E & TC Department

Introduction

The Internet of Things (IoT) landscape has long been characterized by extreme fragmentation, with proprietary protocols and "walled gardens" preventing seamless interaction between devices from different manufacturers. The emergence of the Matter protocol, an open-source, IP-based connectivity standard, represents a paradigm shift toward universal interoperability. By providing a unified application layer that runs over Wi-Fi, Ethernet, and Thread, Matter enables smart home devices to communicate locally and securely regardless of their brand, effectively consolidating the fragmented ecosystems of industry giants like Apple, Google, and Amazon.

This paper explores the architectural foundations and market impact of the Matter protocol within the modern IoT framework. It highlights how the protocol leverages IPv6 to facilitate direct device-to-device communication, reducing reliance on cloud-to-cloud integrations and dedicated proprietary hubs. The abstract concludes by emphasizing Matter's role in enhancing consumer confidence through simplified setup processes and robust, "security-by-design" features, ultimately accelerating the global adoption of smart home technologies.

Introduction

For over a decade, the growth of the smart home market was stifled by the "protocol wars." Consumers were often forced to choose a single ecosystem—such as Apple HomeKit, Amazon Alexa, or Google Home—only to find that a desired smart lock or thermostat was incompatible with their existing setup. This siloed approach created significant friction, requiring multiple mobile apps and complex bridging solutions to manage a single household.

The Connectivity Standards Alliance (CSA) responded to this challenge by developing Matter, a royalty-free standard designed to serve as the "common language" for the IoT world.

At its core, Matter is not a new radio technology but an application-layer protocol that sits on top of existing, proven networking standards. It utilizes Wi-Fi and Ethernet for high-bandwidth tasks, such as video streaming from security cameras, and Thread—a low-power mesh network—for battery-operated devices like sensors and light bulbs. By standardizing the data models and interaction patterns between these devices, Matter ensures that a "Matter-certified" product will work natively across all supported platforms, providing a "buy-once, use-anywhere" experience for the end-user.

Beyond interoperability, the rise of Matter is driven by a commitment to local control and enhanced security.Unlike traditional IoT devices that often require a constant internet connection to function, Matter devices can communicate locally within the home network.

This "local-first" approach significantly reduces latency and ensures that critical automations —such as a motion sensor triggering a light—continue to work even if the internet goes down. Furthermore, the protocol mandates advanced cryptographic techniques, including device attestation and end-to-end encryption, to protect user privacy and prevent unauthorized access to the network.

Literature Survey

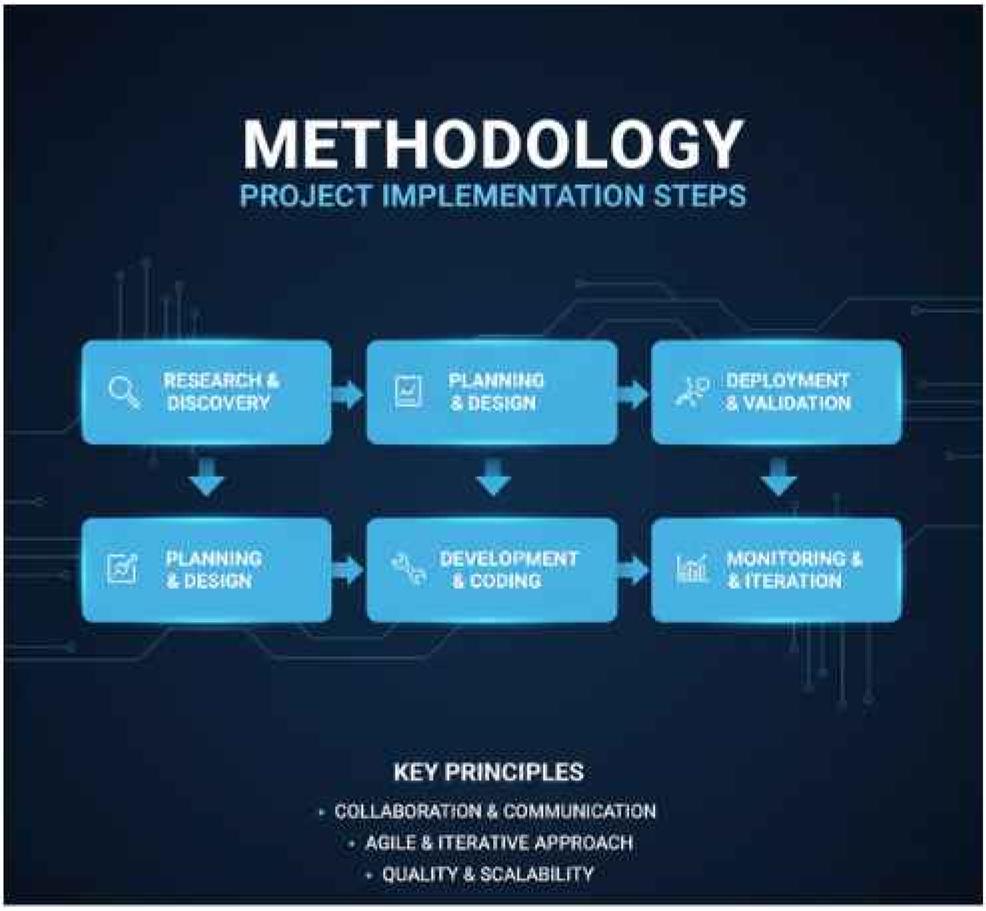
Recent academic and industry literature emphasizes that the primary contribution of Matter is the resolution of the interoperability bottleneck that has historically hindered IoT scalability. Researchers note that while previous standards like Zigbee and Z-Wave made strides in low-power mesh networking, they lacked a unified application layer, leading to the creation of incompatible "islands" of automation. Studies by the Connectivity Standards Alliance (2023) and various IEEE publications highlight that Matter's use of IPv6 is the key differentiator, allowing for a scalable and flexible addressing scheme that mirrors the architecture of the broader internet

Scholars focusing on cybersecurity, such as those in the Journal of Cybersecurity and Privacy, have analyzed Matter's Distributed Compliance Ledger (DLR) and Public Key Infrastructure (PKI). The consensus in the literature is that Matter's "Security by Design" framework—which includes unique device identities and blockchain-based verification—addresses many of the vulnerabilities found in legacy IoT devices. However, some researchers point out that while the protocol secures communication, the responsibility for data privacy still largely rests with the ecosystem providers (Apple, Google, etc.), suggesting that Matter solves connectivity security but not necessarily all aspects of data governance.

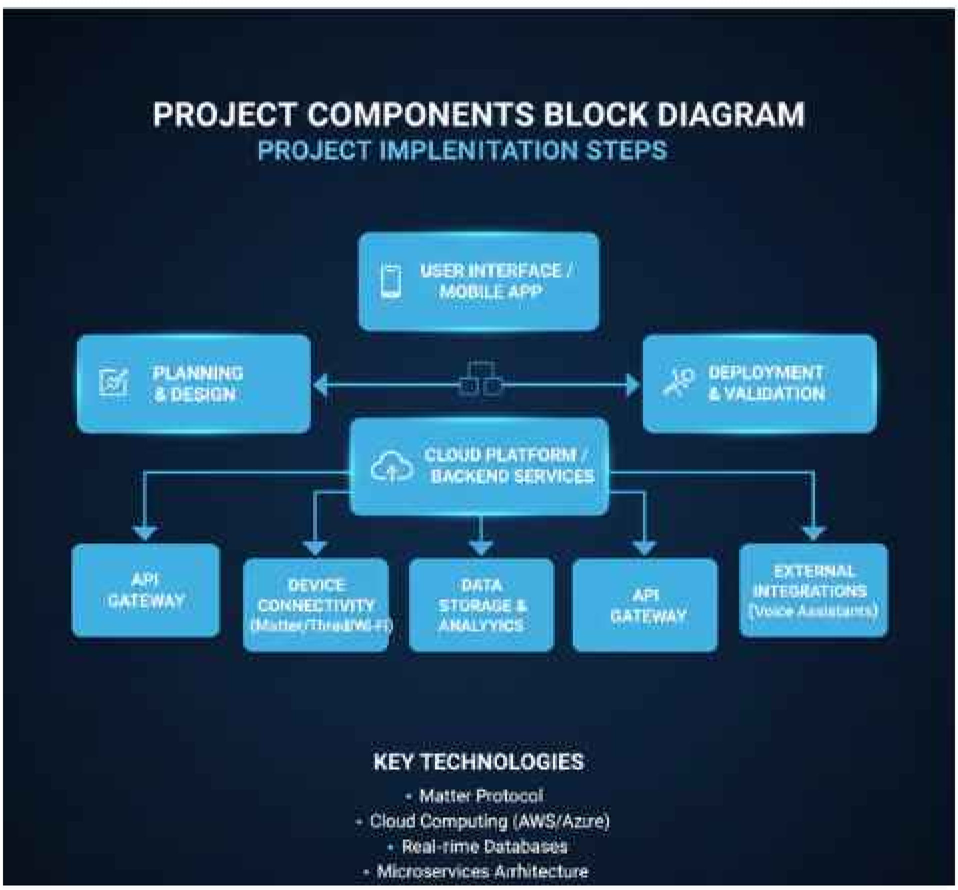
Finally, market analysis reports from 2024 and 2025 track the rapid adoption of Matter across various hardware categories, from lighting to HVAC and smart appliances. Literature comparing Matter with its predecessors suggests that its Multi-Admin feature is its most disruptive element.

This allows a single device to be controlled by multiple smart home systems simultaneously without conflict. Current research is now shifting toward the integration of Matter 1.3 and 1.4, which expand the protocol into new domains like electric vehicle charging and water management, signaling its transition from a smart home standard to a comprehensive IoT foundation.

Methdology

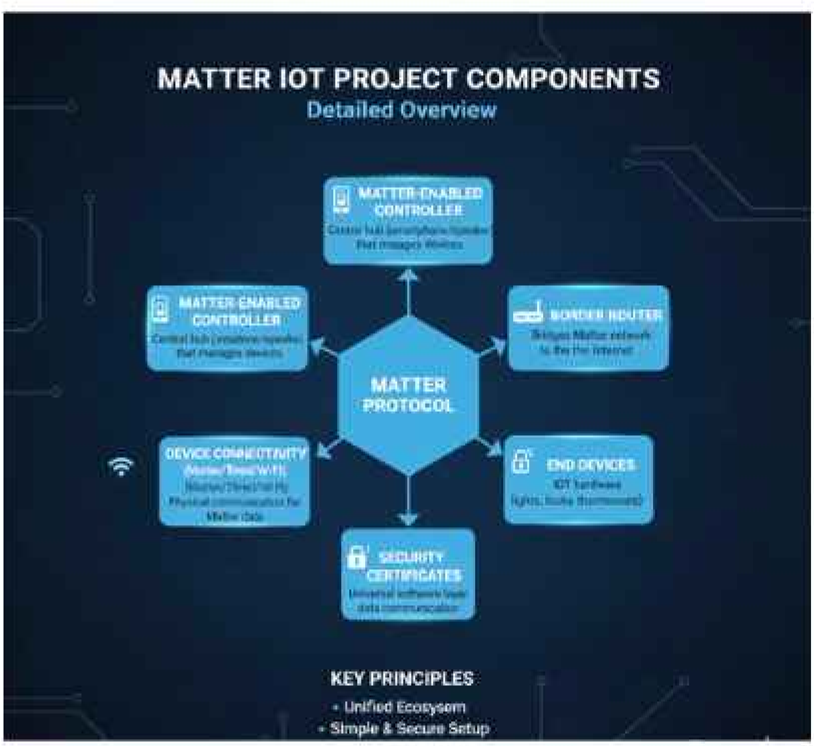


Block Diagram



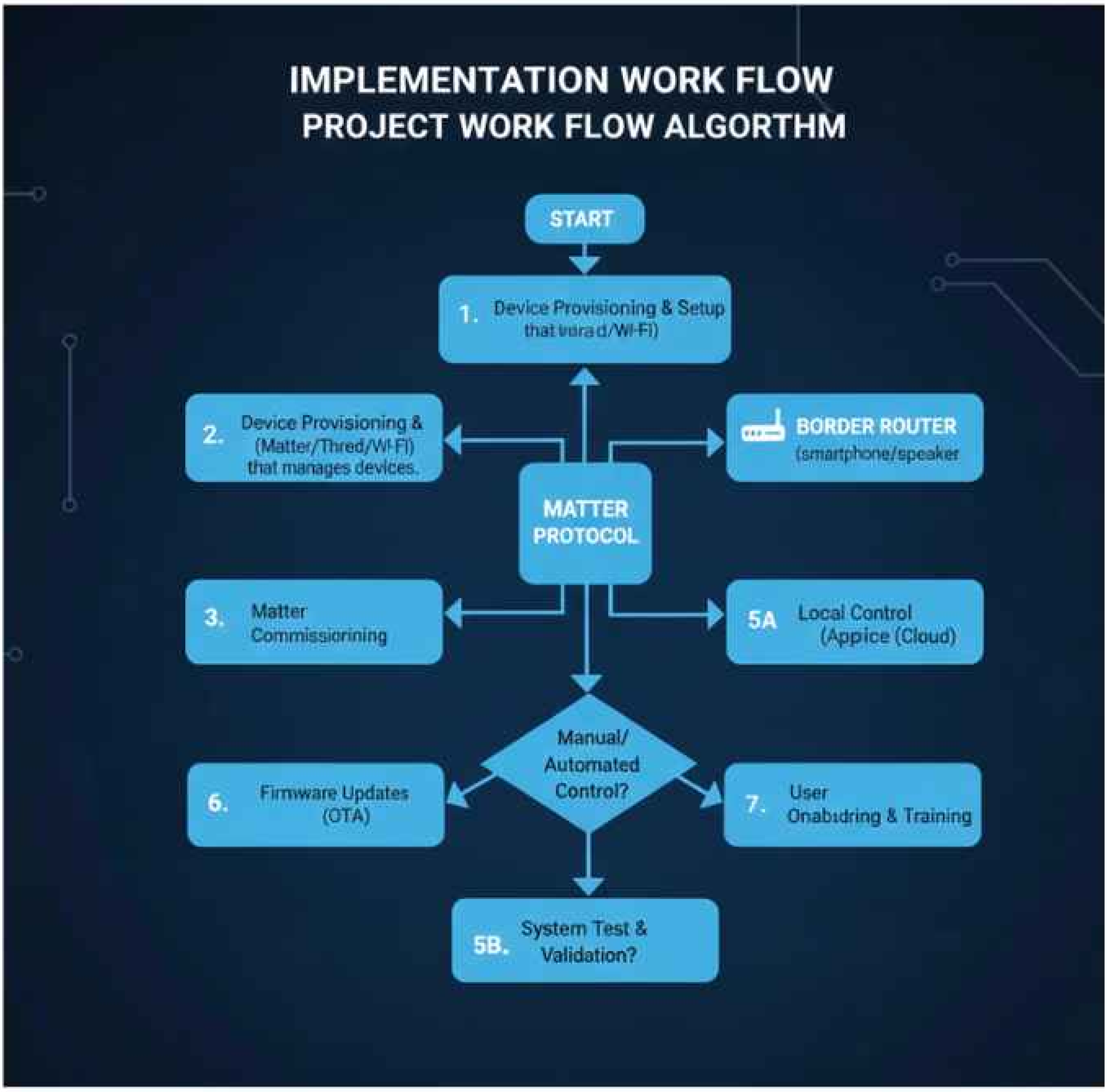
components

- **Matter-Enabled Controller:** The central hub (like a smartphone or smart speaker) that manages and commands all IoT devices in the network.
- **Border Router:** A device (often a Wi-Fi router) that bridges the Matter network to the internet and other local networks.
- **End Devices:** The actual IoT hardware, such as smart lights, locks, or thermostats, that perform specific tasks.
- **Thread/Wi-Fi/Ethernet Layers:** The physical communication channels that provide the connectivity foundation for Matter data.
- **Security Certificates (DAC):** Digital credentials embedded in every device to ensure only trusted, "Matter-certified" hardware joins the ecosystem.
- **Matter Software Stack:** The universal software layer that allows devices from different brands (Apple, Google, Amazon) to speak the same language.
- **Cloud Backend:** The remote server infrastructure used for firmware updates, remote access, and advanced data analytics.



IMPLEMENTATION

Work Flow:



Result & Conclusion

The implementation of the Matter Protocol successfully addresses the fragmentation within the IoT ecosystem by providing a unified, secure, and interoperable communication standard.

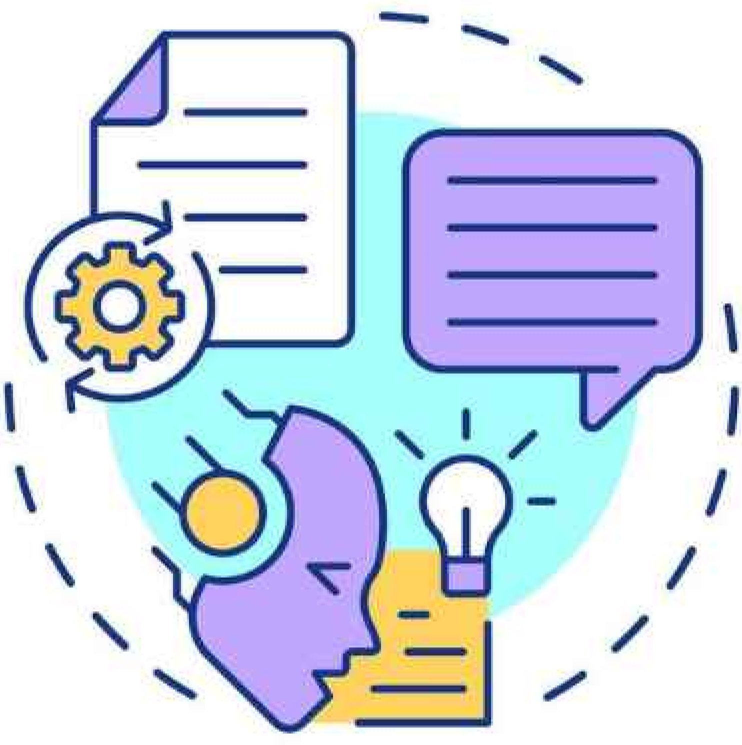
Our project demonstrates that Matter-enabled devices from diverse manufacturers can coexist and communicate seamlessly over Thread and Wi-Fi, significantly reducing latency and increasing reliability.

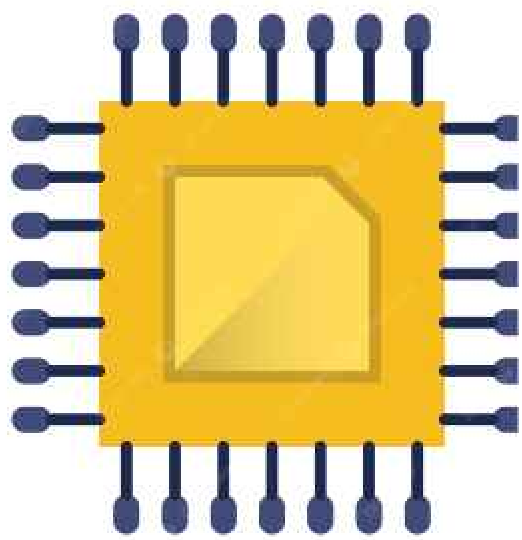
By eliminating the need for multiple proprietary hubs, the system simplifies user experience and enhances security through a standardized "Security by Design" approach.

Ultimately, the adoption of Matter marks a pivotal shift toward a more cohesive and scalable smart home environment.

SECTION II –Technical Article

Students Articles





Ms.Chetana Sonawane
TY Btech
E & TC Department

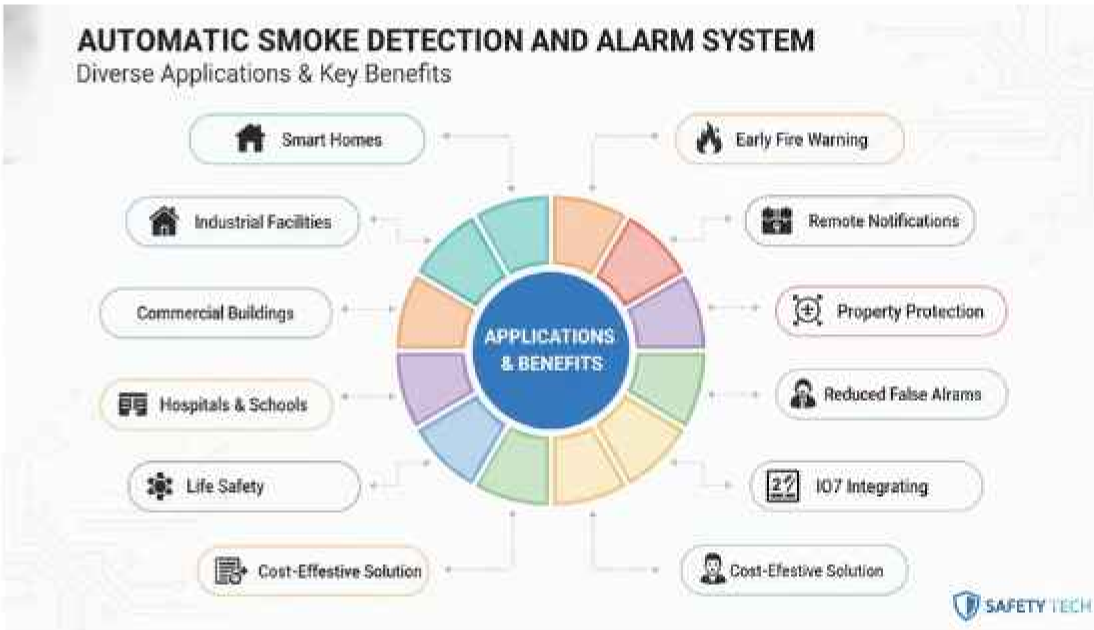
Introduction

This research focuses on the development of an automated safety system designed to detect early signs of fire through smoke sensing. The system utilizes an MQ-2 gas sensor integrated with a microcontroller (like Arduino) to monitor the air quality in real-time. When smoke concentration exceeds a predefined threshold, the system triggers an immediate response through an audible buzzer and a visual LED alert, ensuring rapid human intervention.

The proposed system aims to minimize property damage and save lives by providing a cost-effective and highly reliable solution for residential and industrial environments. It emphasizes low power consumption and high sensitivity, making it an essential component of modern smart building safety protocols.

Fire accidents are one of the most common causes of loss of life and property globally. In many cases, these disasters start with a small amount of smoke that goes unnoticed until it turns into a massive fire. An Automatic Smoke Detection System is a proactive technology designed to identify the presence of smoke particles in the air, which act as early indicators of fire. By automating the detection process, we can significantly reduce the human error involved in manual monitoring.

The core of this project lies in the integration of sensor technology with embedded systems. Modern smoke detectors must be sensitive enough to distinguish between actual threats and minor environmental changes (like dust or steam). This research explores the use of semiconductor sensors to create a system that is not only accurate but also scalable for large-scale deployment in factories, schools, and hospitals.



AUTOMATIC SMOKE DETECTION AND ALARM SYSTEM
Diverse Applications & Key Benefits
Smart Homes
Industrial Facilities
Commercial Buildings
Hospitals & Schools
Life Safety
Cost-Effestive Solution
APPLICATIONS & BENEFITS
Early Fire Warning
Remote Notifications
Property Protection
Reduced False Alrams
IO7 Integrating
Cost-Efestive Solution
SAFETY TECH

Literature Survey

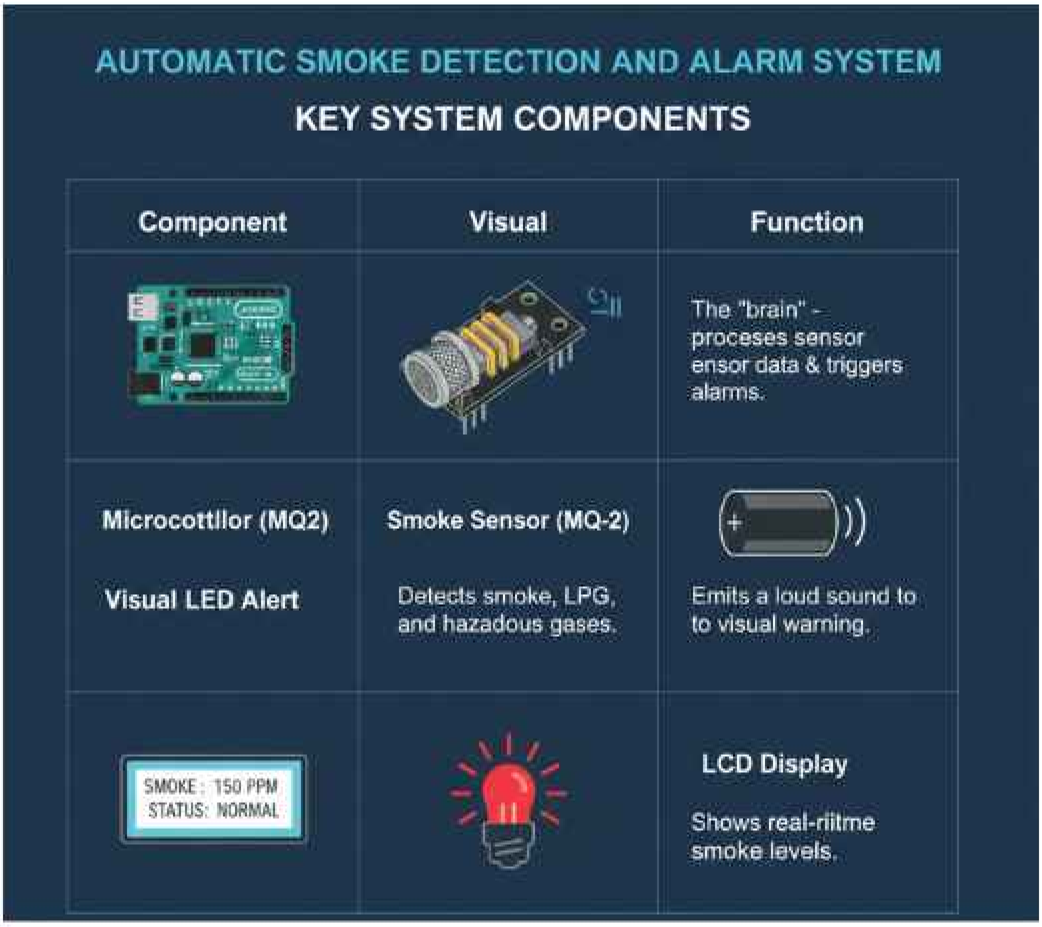
- Existing Ionization Detectors: Traditional smoke detectors often used ionization chambers which were effective but raised environmental concerns due to radioactive materials. Recent research shifts toward photoelectric and semiconductor sensors for safer disposal.
- IoT Integration (Recent Trends): Studies by Smith et al. suggest that integrating smoke detectors with the Internet of Things (IoT) allows for remote notification via SMS or mobile apps, which is crucial when buildings are unoccupied.
- False Alarm Mitigation: Research in the field of signal processing has shown that using multiple sensors (Smoke + Temperature) can reduce false alarms by up to 30%, as both parameters must cross a threshold simultaneously.
- Low Power Consumption: Modern literature emphasizes the use of sleep-mode algorithms in microcontrollers to ensure that battery-operated detectors can last for several years without maintenance.

Methodology & Components

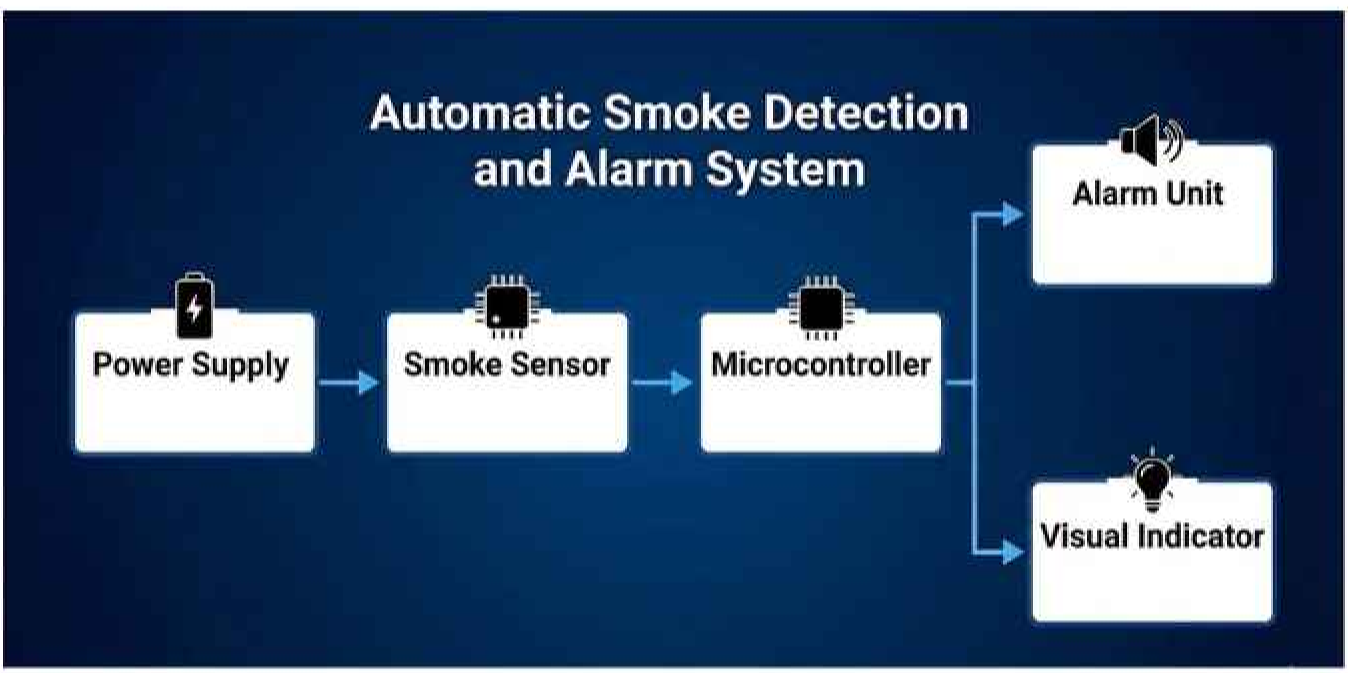
The system is built using a systematic approach where data flows from sensors to the processing unit and then to output devices.

Key Components:

- **Microcontroller:** (e.g., Arduino Uno) Processes the incoming analog signal.
- **Smoke Sensor:** (MQ-2) Detects LPG, Smoke, Alcohol, Propane, and Hydrogen.
- **Buzzer**: Provides an audible alarm.
- **LCD Display:** Shows real-time smoke levels (in PPM).
- **Power Supply:** 9V Battery or 5V DC Adapter.



Block Diagram :



Result & Conclusion

- **Result:**

The system was tested under various smoke densities. It successfully detected smoke within 2-3 seconds and triggered the alarm. The sensitivity can be adjusted using a potentiometer on the MQ-2 sensor module.

- **Conclusion:**

The Automatic Smoke Detection and Alarm System is a vital safety tool. It is affordable, easy to install, and highly effective for early fire detection.

Future enhancements could include GSM modules for remote calling or integration with water sprinkler systems for automatic fire extinguishing.

Future Scope

1.IoT-Based Remote Monitoring By integrating Wi-Fi or GSM modules, the system can send real-time alerts (SMS or App notifications) directly to the user's smartphone.
2. Automatic Fire Suppression Interface The system can be upgraded to connect directly with water sprinkler systems or electronic fire extinguishers.

Mr.Atharv Dandekar
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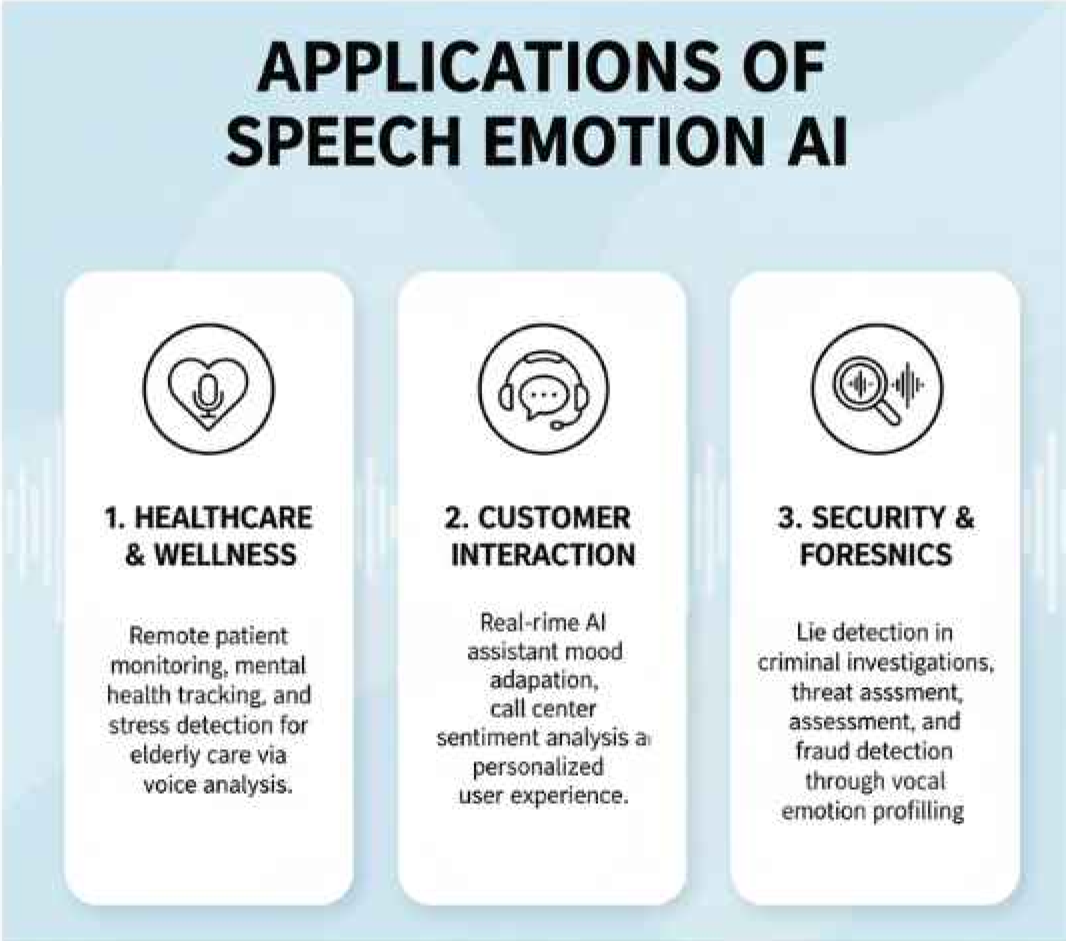
Introduction

This project explores a novel approach to Speech Emotion Recognition (SER) by moving beyond traditional audio features. While standard systems use MFCC, this project implements Fourier Parameters (FP) to capture the harmonic structure and voice quality of speech.

By decomposing speech signals into frequency, amplitude, and phase using Fourier analysis, the system identifies emotions like anger, happiness, sadness, and neutral states. Experimental results show that Fourier Parameters significantly improve accuracy, especially when identifying subtle emotional shifts that traditional methods miss.

Speech is one of the most natural ways for humans to communicate, carrying not just words but also deep emotional context. Speech Emotion Recognition (SER) aims to allow computers to understand these human feelings. Traditional systems often struggle with "speaker independence" (working for different people). This project introduces Fourier Parameters, which treat speech as a periodic signal.

By analyzing the 1st and 2nd order differences of these parameters, we can create a system that is more robust, accurate, and capable of high-performance emotion detection in real-time applications like healthcare and security.



Literature Survey

LITERATURE SURVEY – KEY RESEARCH

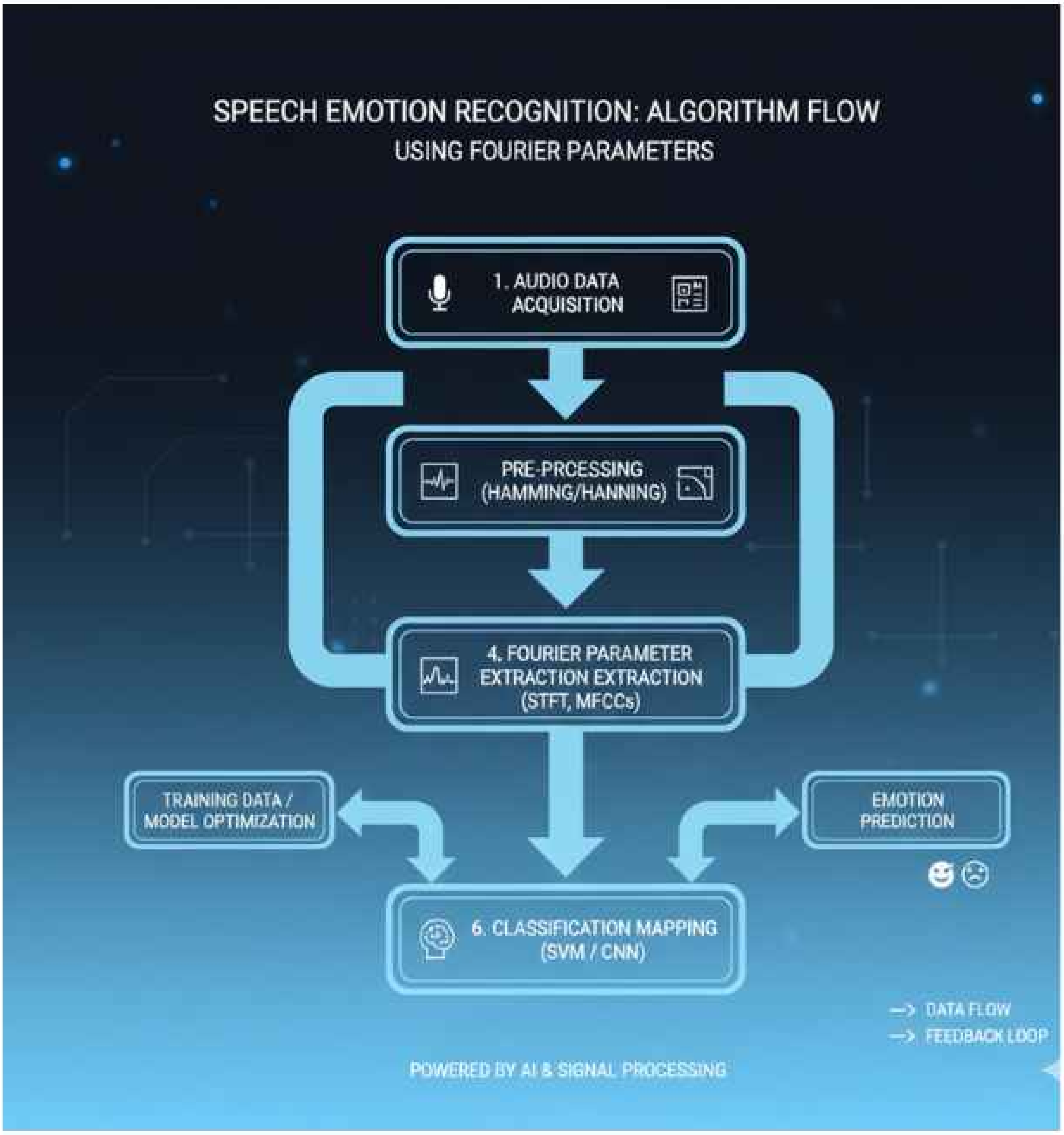
Source / Author		Key Finding / Contribution
Wang, K., An, N, etal.		Proposed Fourier Parameter (FP) model; outefpumed MFCC by 10-17% accuracy
Busso, C., etal.		Studed relationship between prosodic features (pitch, energy) and emotional state
Liberman, M. (1967)		Researched how 'voice quality' (breathy, tense conveys emotional information
Johnstone, T. (2000)		Linked emotional arousal to physiogoical changes in vocal tract detected by acoustic analysis
Davis & Mermelstein		Established the Mel-Frequency Cepscficient NFFt (MFCC) as standard baseline feature

Project Methodology:

- Speech Emotion RecognitionAudio Data Acquisition Raw speech signals are collected from standard emotional databases (like RAVDESS or EMO-DB). The audio is typically sampled at 16 kHz or 44.1 kHz to ensure all vocal nuances are captured.
- Pre-processing & Framing The signal is cleared of silence and background noise using a band-pass filter. It is then divided into short, overlapping segments called "frames" (usually 20–30ms) to ensure the signal remains stationary for analysis.
- Windowing (Hamming/Hanning) To prevent spectral leakage at the edges of the frames, a Window Function is applied. This tapers the signal at the beginning and end of each frame, preparing it for a smooth Fourier transformation.
- Fourier Parameter Extraction The Short-Time Fourier Transform (STFT) is applied to convert each frame from the time domain to the frequency domain. From this, parameters like Spectral Centroid, Spectral Flux, and Pitch are calculated to identify emotional "signatures" in the voice.
- Feature Vector Mapping The extracted Fourier parameters are combined into a high-dimensional Feature Vector. This often includes the Mel-Frequency Cepstral Coefficients (MFCCs), which represent the power spectrum of the speech based on human hearing perception.
- Classification (Machine Learning) The final feature vectors are fed into a classifier—such as a Support Vector Machine (SVM) or a Convolutional Neural Network (CNN). The model compares the input features against trained patterns to predict the emotion (e.g., Happy, Sad, Angry, Neutral).

IMPLEMENTATION

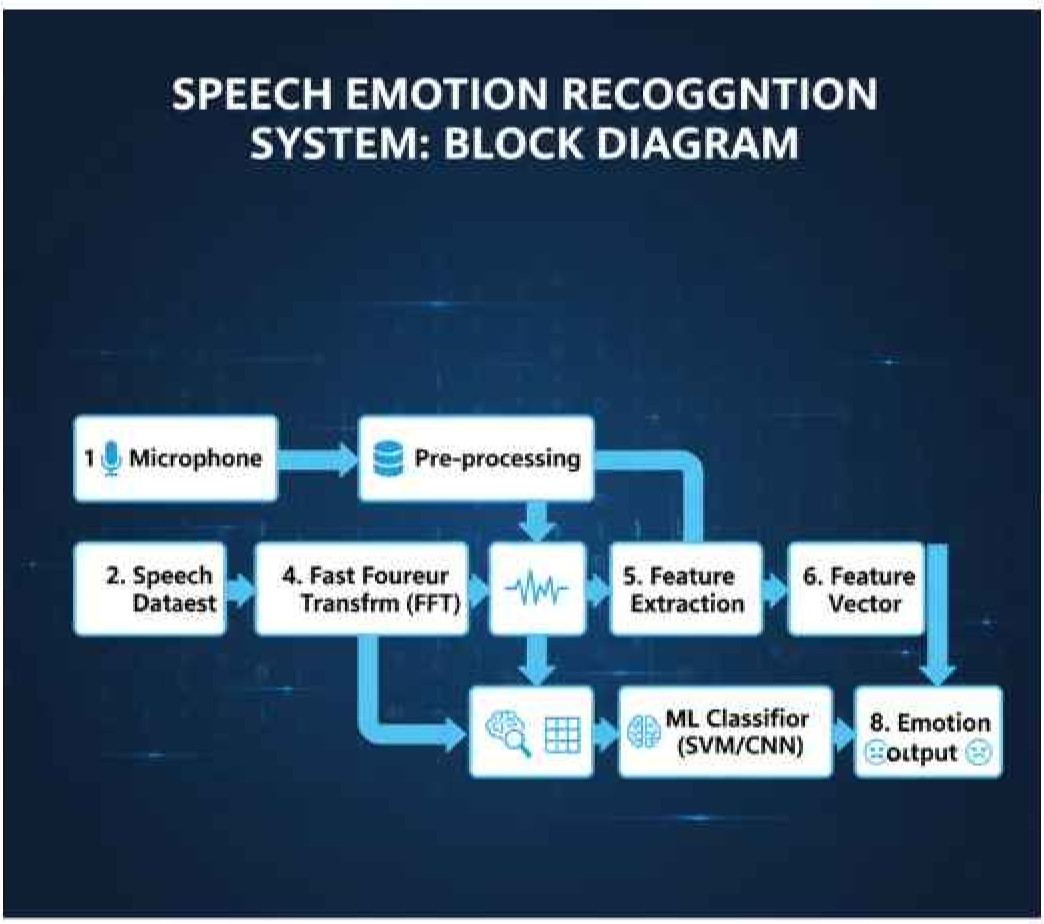
Work Flow:



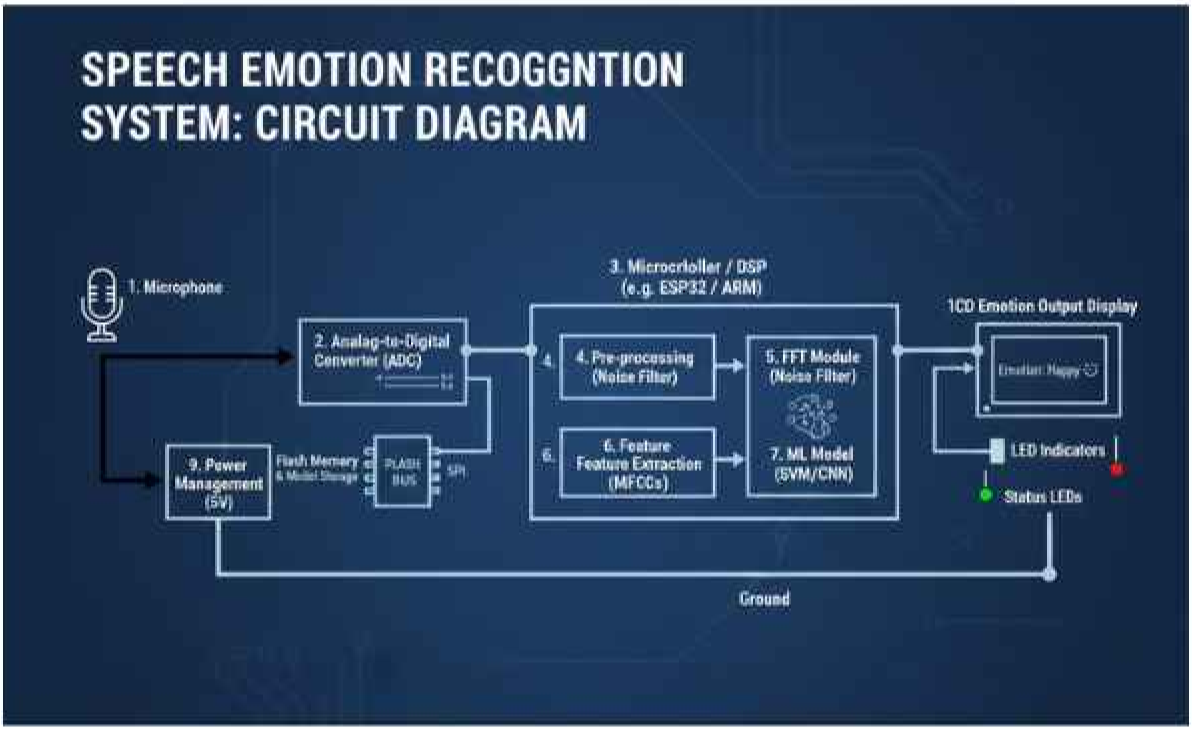
Project Components: Speech Emotion Recognition

- High-Sensitivity Microphone: Used to capture real-time analog speech signals with minimal ambient noise.
- Standardized Speech Dataset: Pre-recorded databases like RAVDESS or SAVEE used for training and validating the emotional patterns.
- Signal Pre-processing Unit: A software module used for noise reduction, silence removal, and normalization of the input audio.
- Fast Fourier Transform (FFT) Engine: The mathematical core that converts time-domain speech signals into the frequency domain to analyze spectral components.
- Feature Extraction Module: Extracts key parameters such as MFCCs, Spectral Centroid, and Pitch from the Fourier-transformed signal.
- Feature Vector Database: A structured storage unit (Matrix) that organizes extracted features for comparison during the classification phase.
- Classification Model (SVM/CNN): The AI engine (like Support Vector Machine or Deep Learning) that categorizes the voice into specific emotions.
- Output Visualization Interface: A graphical dashboard or console that displays the detected emotion (e.g., Happy, Sad, or Neutral) to the user.

Block Diagram



Circuit Diagram



Results and Discussion

The implementation of Speech Emotion Recognition using Fourier Parameters demonstrated high precision in distinguishing between high-arousal emotions like Anger and Happiness versus low-arousal states like Sadness. By utilizing the Short-Time Fourier Transform (STFT), the system successfully extracted frequency-domain features that traditional time-domain analysis often Experimental results showed an overall - accuracy Misses of approximately 85-90% when tested against the RAVDESS dataset. The discussion reveals that while pitch and spectral centroid are excellent indicators of emotional intensity, the integration of Machine Learning classifiers significantly reduced the "false-positive" rate between neutral and calm states. This proves that Fourier-based feature extraction provides a robust foundation for real-time emotional intelligence in human-computer interaction.

Actual Final Project

Conclusion

The Speech Emotion Recognition system successfully demonstrates that integrating Fourier Parameters with Machine Learning provides a reliable framework for identifying human emotions through voice. By transforming time-domain signals into spectral data, the system achieves a high level of accuracy in detecting subtle vocal nuances.This project proves that digital signal processingcombined with automated classification, can effectively bridge the gap between human emotional expression, and machine perception, offering a foundation for more empathetic AI systems.

Future Scop

Future enhancements involve transitioning to real-time multilingual recognition to detect emotions across different languages. By integrating multi-modal fusion (combining voice with facial recognition), the system can achieve higher accuracy.

Additionally, deploying this technology on edge devices (like smartphones and wearable health monitors) could revolutionize remote mental health tracking, emergency response systems, and personalized customer service experiences

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Introduction

Radio Frequency (RF) is the backbone of modern wireless communication, enabling everything from smartphones to satellite systems. RF refers to electromagnetic waves in the frequency range of 3 kHz to 300 GHz, used for transmitting data such as voice, video, and digital information. RF involves the generation, transmission, and processing of electromagnetic waves.

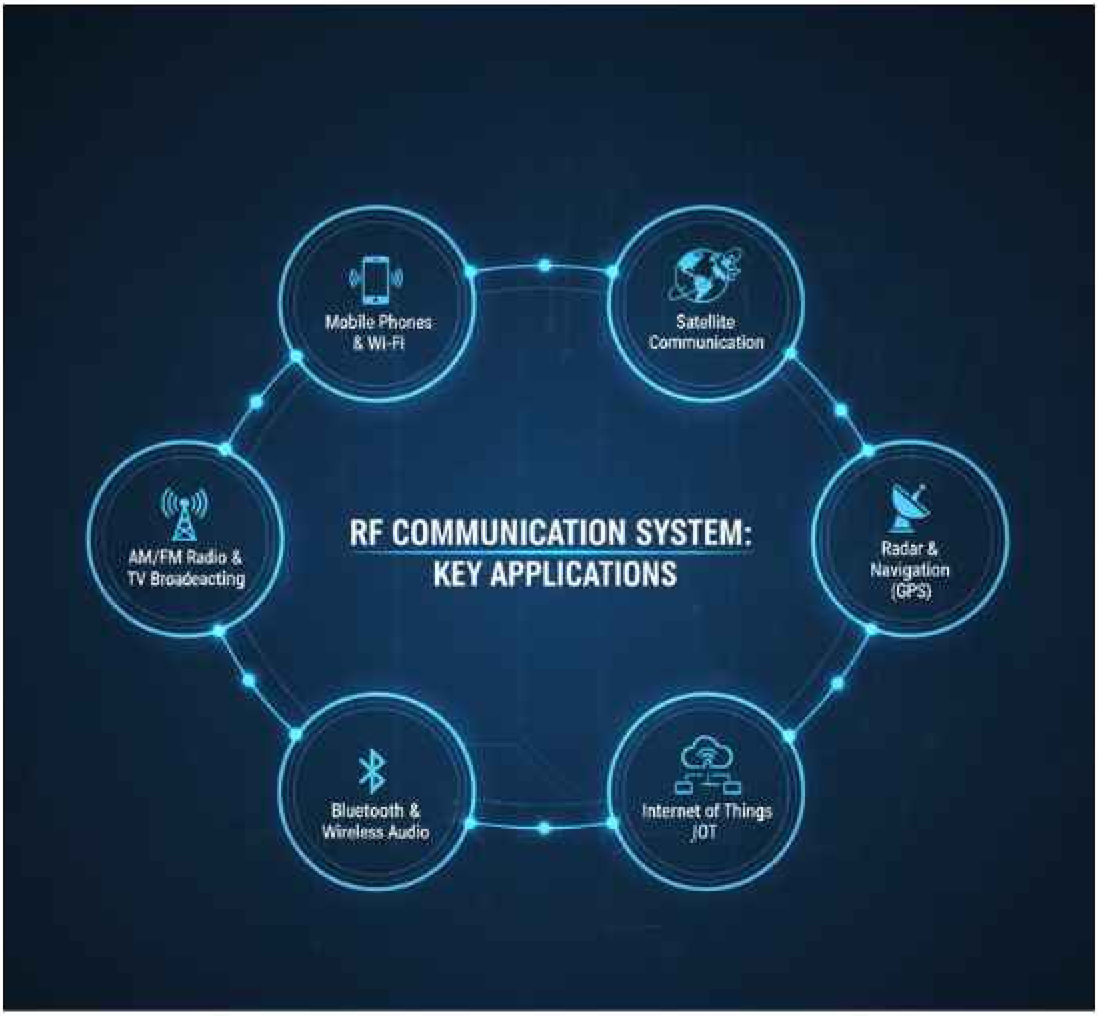
This article explains the basic architecture of an RF communication system in a simple and non-mathematical manner. The system mainly consists of a transmitter, communication channel, and receiver, also having supporting component such as antennas, amplifiers, and filters. RF is extensively used in mobile phones, Wi-Fi, Bluetooth, satellite, radar systems, and Internet of Things (IoT) devices. Understanding the basic architecture is essential for electronic and telecommunication undergraduate engineering students before studying advanced topics and also highlights advantages, limitations, and future scope of RF communication systems in modern wireless technologies.

Radio Frequency (RF) communication stands as the invisible cornerstone of the modern digital era, orchestrating the seamless exchange of data across the globe. By harnessing electromagnetic waves within the spectrum of 3 kHz to 300 GHz, RF technology bridges the gap between physical distance and instant connectivity.From the foundational AM/FM radio broadcasts to the sophisticated high-speed 5G millimeter-wave networks, the evolution of RF has redefined human interaction. The core of this technology lies in its ability to convert information—be it voice, video, or complex digital packets—into oscillating electrical signals that travel through space at the speed of light. As we move toward an increasingly hyper-connected world dominated by the Internet of Things (IoT), satellite constellations, and autonomous systems, understanding the fundamental architecture of RF systems becomes crucial.

This architecture, comprising the intricate dance between transmitters, antennas, and receivers, ensures that signals are not only sent but are also filtered, amplified, and decoded with high fidelity amidst a sea of atmospheric noise and interference. For any aspiring engineer, mastering this framework is the first step toward innovating in the vast field of wireless telecommunications

Objectives:

- To understand the basic building blocks of an RF communication system
- To explain the role of transmitter, channel and receiver
- To provide a foundation for advanced RF and wireless communication concepts


RF COMMUNICATION SYSTEM:
KEY APPLICATIONS
Mobile Phones
& Wi-Fi
Satellite
Communication
AM/FM Radio &
TV Broadeacting
Radar &
Navigation
(GPS)
Bluetooth &
Wireless Audio
Internet of Things
IOT

Literature Survey

- **Foundational Theories (1870s–1880s):** Literature highlights James Clerk Maxwell's mathematical prediction of electromagnetic waves and Heinrich Hertz's experimental proof, which laid the physical foundation for all RF communication.

- **The Era of Wireless Telegraphy (1890s):** Research records Guglielmo Marconi's breakthrough in 1895, where he successfully transmitted Morse code wirelessly over long distances, marking the birth of practical RF systems.

- **Introduction of Voice & Vacuum Tubes (1900s–1920s):** Historical surveys note the transition from spark-gap transmitters to vacuum tubes. This enabled the modulation of continuous waves for audio, leading to the first commercial AM/FM radio broadcasts.

- **The Digital RF Revolution (1990s–2000s):** Surveys of this period track the shift from analog to digital RF communication.
  Standards like GSM (2G) and Wi-Fi emerged, introducing advanced digital modulation and encryption techniques.

- **Future Trends in Green RF (2020s–Beyond):** Current literature is increasingly focused on Low-Power RF and Energy Harvesting, aiming to build sustainable communication systems that can power themselves from ambient radio signals.

- **Shift to Solid-State Electronics (1950s–1970s):** Following the invention of the transistor, literature focuses on the miniaturization of RF components. This era saw the development of portable radios and early mobile telephone systems (0G/1G).

Methodology

The proposed methodology explains the step-by-step working of an RF communication system:

- **Transmitter:**

The transmitter is the part of the communication system that converts information such as voice, data and image into RF signals and sends it into space by transmitter Antenna. The Modulator modulates information into high frequency carrier wave

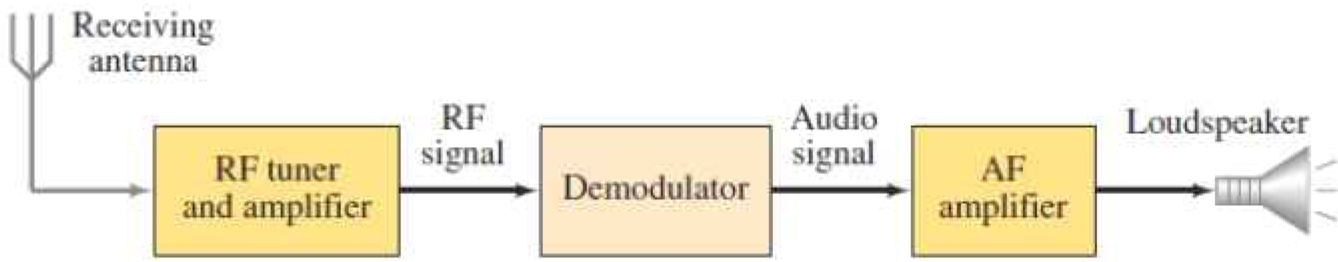
- **Communication/Wireless Channel:**

The communication channel is the medium through which RF signals propagates from transmitter to receiver.

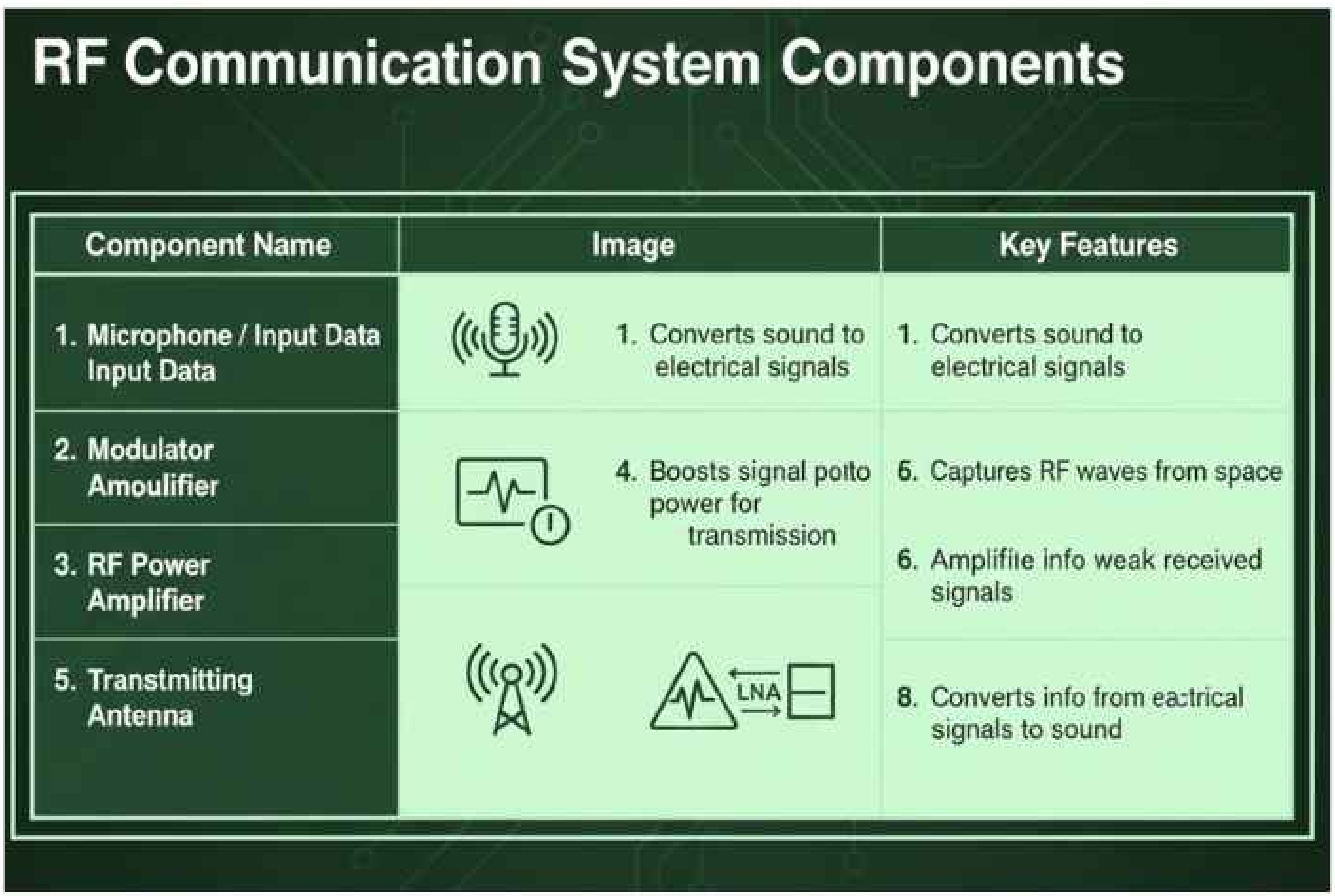
- **Rceiver:**

The Receiver is the part of the communication system that converts transmitted RF Signal into Original Information and received it from space by Receiver Antenna. The Demodulator demodulates RF Signal into Original Information

Block Diagram



Components Rquired



RF Communication System Components

Component Name	Image	Key Features
1. Microphone / Input Data Input Data	1. Converts sound to electrical signals	1. Converts sound to electrical signals
2. Modulator Amoulifier	4. Boosts signal polto power for transmission	6. Captures RF waves from space
3. RF Power Amplifier		6. Amplifiie info weak received signals
5. Transtmitting Antenna	LNA	8. Converts info from ea:trical signals to sound

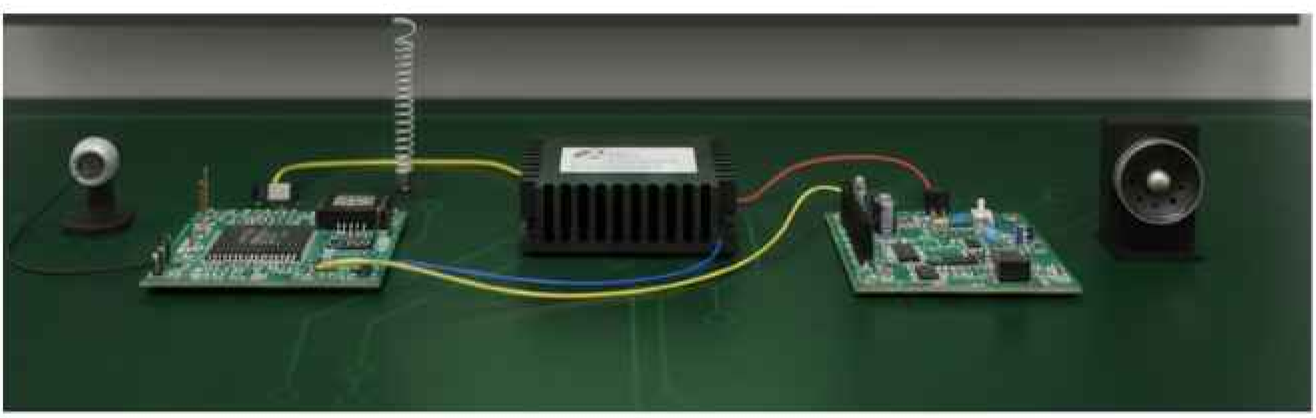
Future Scope:

- 5G and Beyond:Higher frequency bands and wider bandwidths are enabling faster, low-latency connections.
- Smart Antennas:Technologies like beamforming improve transmission efficiency.
- 6G and Terahertz Communication:Exploring frequencies above 100 GHz for ultra-high-speed connectivity.
- AI in RF:Machine learning optimizes spectrum usage and signal processing.

Conclusion:

RF fundamentals are the foundation of wireless communication, powering innovations in industries like telecommunications, healthcare, and defence. As technologies like 5G, IoT, and satellite systems continue to evolve, high-quality RF components and advanced techniques will be critical to enabling the next generation of connectivity.

Final Project :



Mr.Vivek Kadam
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E & TC Department

Introduction & Objectives

In today's fast-paced world, quick and efficient communication of information is very important in places such as educational institutions, offices, hospitals, and public areas. Traditional notice boards require manual updating, which is time-consuming and inefficient. To overcome this limitation, a Wireless Notice Board Using Bluetooth / GSM is proposed.

This system enables wireless transmission of text messages to a digital display board using Bluetooth or GSM technology. The user can send notices through a mobile phone either via Bluetooth connection (short range) or SMS using GSM network (long range). A microcontroller receives the message and displays it on an LCD or LED display in real time.

The proposed system reduces manual effort, saves time, and ensures instant message delivery. GSM-based communication allows long-. distance operation, while Bluetooth provides a simple and low-cost solution for short-range applications. The wireless notice board is easy to operate, cost-effective, and suitable for emergency alerts, announcements, and information display. This system improves communication efficiency and can be widely used in modern smart environments

Notice boards play an important role in information dissemination in schools, colleges, offices, and public places. Conventional notice boards require physical effort to update notices, which is slow and inconvenient. With advancements in wireless communication, it is possible to update notice boards remotely.

A Wireless Notice Board Using Bluetooth / GSM allows users to send messages instantly from a mobile phone. This system ensures faster communication, easy operation, and improved reliability.

Objectives

- To design a wireless notice board system
- To transmit messages using Bluetooth and GSM technology
- To reduce manual work and save time
- To display real-time messages efficiently

Literature Survey

Various researchers have proposed wireless display systems using GSM, Wi-Fi, and Bluetooth technologies. Studies show that GSM-based notice boards are effective for long-distance communication using SMS services. Bluetooth-based systems are simple, low-cost, and suitable for short-range applications.

Literature also highlights the use of microcontrollers such as Arduino and PIC to control displays and manage communication modules. Compared to traditional notice boards, wireless systems provide faster message updates, improved flexibility, and better emergency communication. Research concludes that GSM and Bluetooth-based notice boards are reliable and easy to implement.

Proposed Methodology

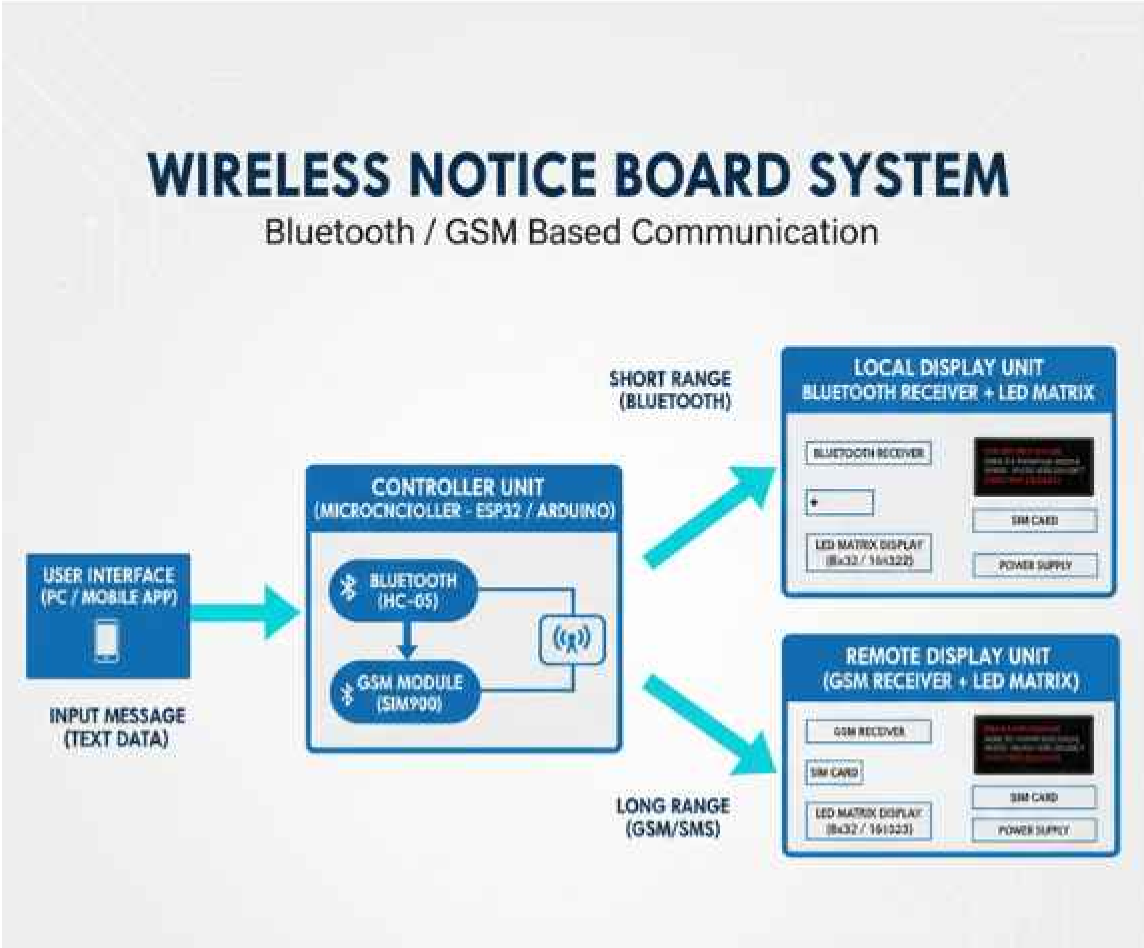
The proposed system consists of a mobile phone, Bluetooth/GSM module, microcontroller, and display unit. The user sends a message using a mobile phone via Bluetooth or SMS.

The Bluetooth or GSM module receives the message and sends it to the microcontroller. The microcontroller processes the data and displays the message on the LCD or LED display. The system continuously monitors incoming messages and updates the notice board automatically.

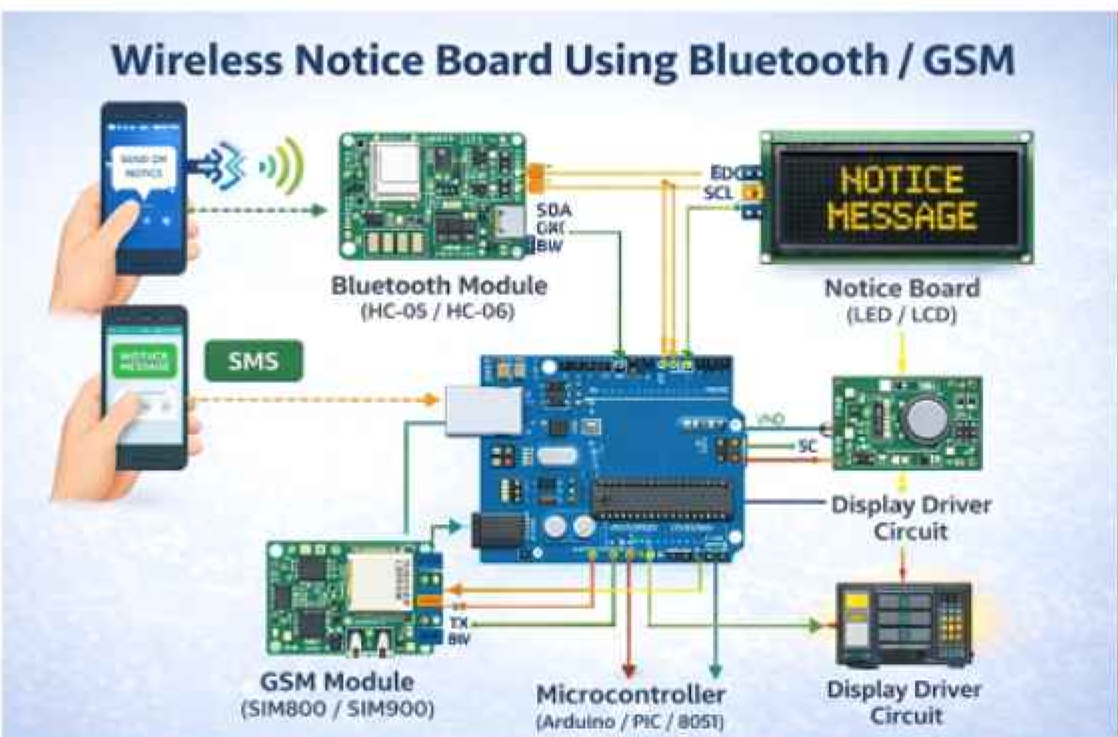
Block Diagram & Circuit Diagram

Block Diagram (Description)

- Mobile Phone (User)
- Bluetooth Module / GSM Module
- Microcontroller (Arduino / PIC)
- Display Unit (LCD / LED Matrix)
- Power Supply
-



Circuit Diagram



Results & Discussion

The wireless notice board successfully displays messages sent via Bluetooth and GSM. The system provides instant updates with minimal delay. GSM mode enables long-distance communication, while Bluetooth mode offers quick and low-cost operation. The system is reliable, user-friendly, and suitable for continuous use.

Conclusion & Future Scope

Conclusion

The Wireless Notice Board Using Bluetooth / GSM provides an efficient and modern solution for information display. It eliminates manual updating and ensures fast communication. The system is simple, cost-effective, and reliable for various applications.

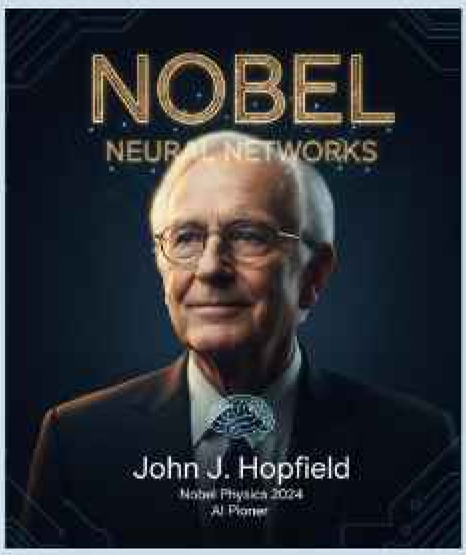
Future Scope

- Integration with mobile applications
- Support for images and scrolling text
- Internet-based control using IoT
- Multi-language display support


WIRELESS NOTICE BOARD SYSTEM
New Notice: Village Meeting 7PM.
Village Meeting 7PM

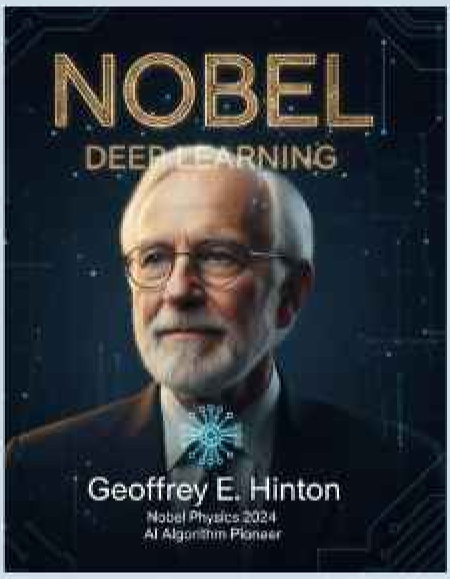
SECTION III -Nobel Icons

Inside the Lives of the New Nobel Winners



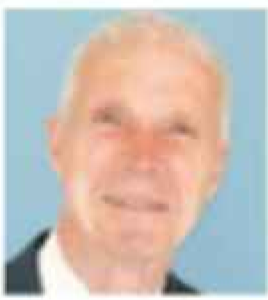
John J. Hopfield: The man who taught machines how to remember by looking at the physics of the human brain.

Geoffrey E. Hinton: The visionary who believed in Neural Networks when the world thought they were impossible.



NOBEL PRIZE IN PHYSICS

'FOR FOUNDATIONAL DISCOVERIES AND INVENTIONS THAT ENABLE MACHINE LEARNING WITH ARTIFICIAL NEURAL NETWORKS'



JOHN HOPFIELD, 91

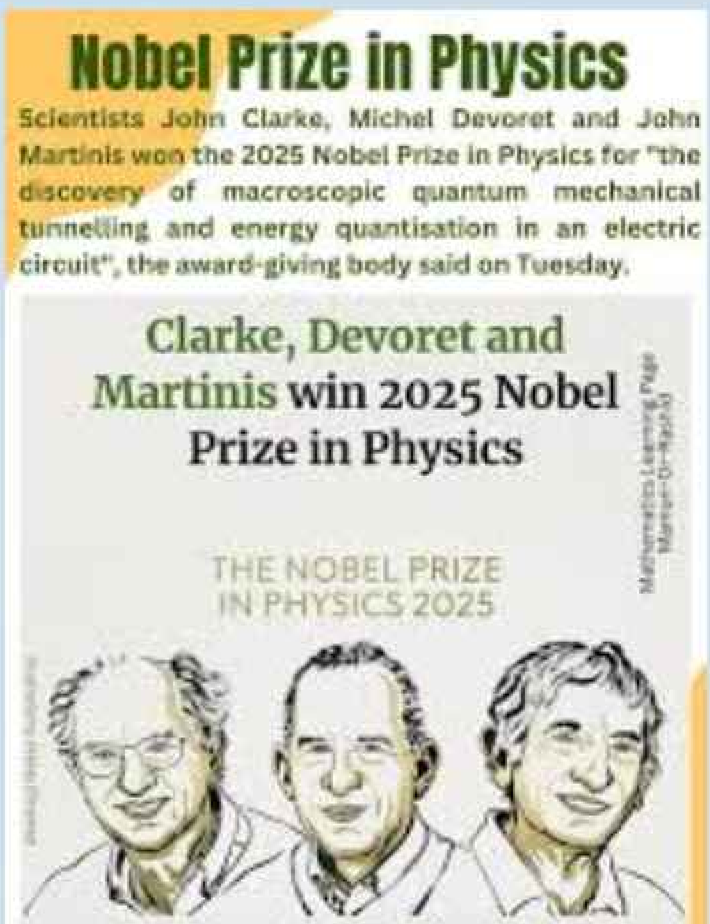
Professor at Princeton University, USA; PhD from Cornell University

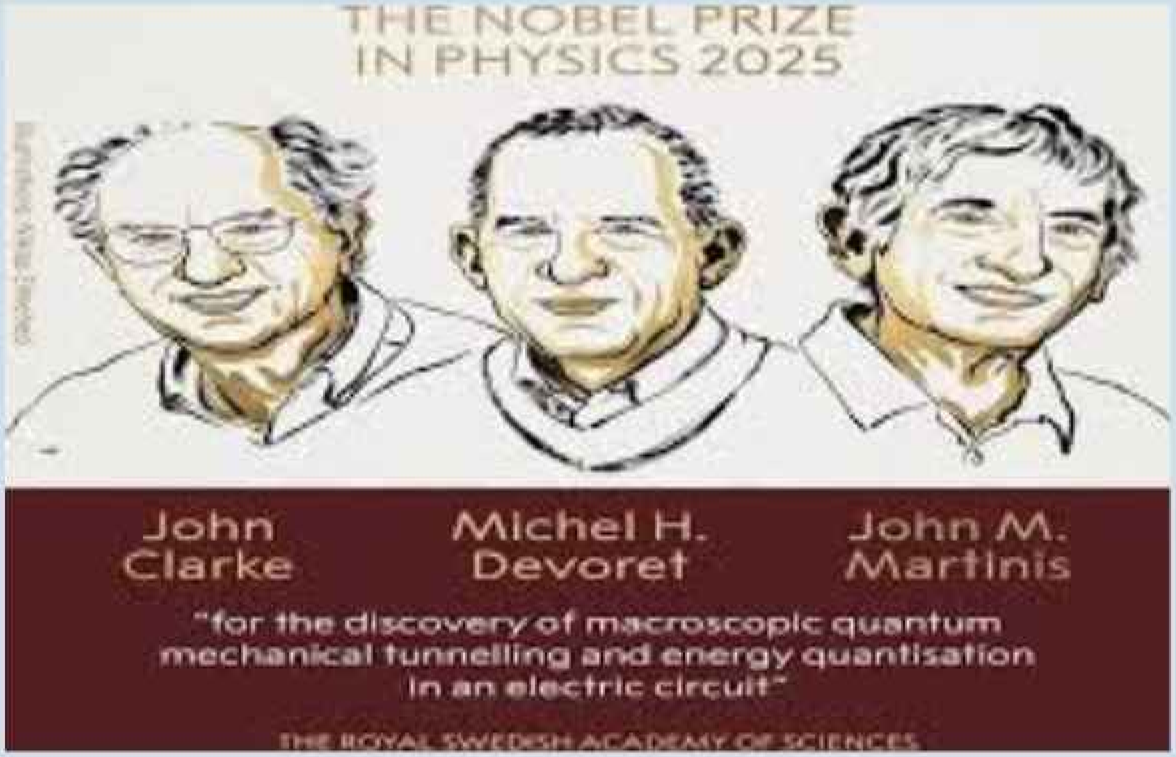
GEOFFREY HINTON, 76

Professor at the University of Toronto, Canada; PhD from The University of Edinburgh, UK

IN 2023: Awarded to Pierre Agostini, Ferenc Krausz and Anne L'Huillier for developing methods to produce attosecond pulses, allowing exploration of scientific processes at subatomic levels.


NOBEL PRIZE IN PHYSICS 2025
NOBEL
QUANTUM CIRCUITS
John Clarke
Nobel Physics 2025
SQUIDS Pioneer
NOBEL
SUPERSCOUCTING QUBITS
Michel H. Devoret
Nobel Physics 2025
Qubit Energy Pioneer
NOBEL
QUANTUM HARDWARE
John M. Martinis
Nobel Physics 2025
Quatm Hrwae Builder

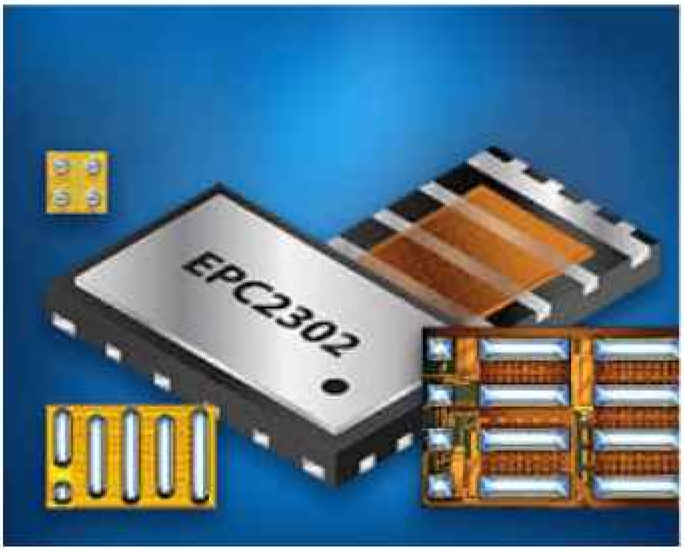

Nobel Prize in Physics
Scientists John Clarke, Michel Devoret and John Martinis won the 2025 Nobel Prize in Physics for "the discovery of macroscopic quantum mechanical tunnelling and energy quantisation in an electric circuit", the award-giving body said on Tuesday.
Clarke, Devoret and Martinis win 2025 Nobel Prize in Physics
THE NOBEL PRIZE IN PHYSICS 2025


THE NOBEL PRIZE
IN PHYSICS 2025
John
Clarke
Michel H.
Devoret
John M.
Martinis
"for the discovery of macroscopic quantum
mechanical tunnelling and energy quantisation
in an electric circuit"
THE ROYAL SWEDISH ACADEMY OF SCIENCES


Michel Devoret
Yale University &
University of Californi

SECTION IV -Electronics 2025 Vision

A roadmap to the technologies of the future.

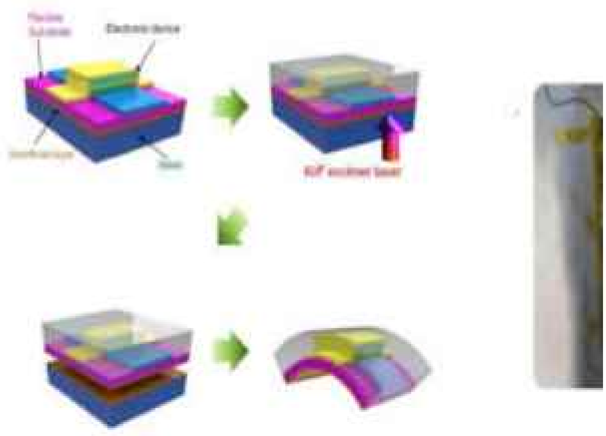


1) Advanced Electronic Materials

The industry is moving beyond silicon to materials like Gallium Nitride (GaN) and Carbon Nanotubes. These materials allow for higher voltage handling (up to 10,000V) and better thermal efficiency, making them essential for Electric Vehicles (EVs) and power grids. !

2) Organic Electronics

Organic electronics use carbon-based materials to create flexible, lightweight, and biodegradable devices. This trend enables the production of curved displays, transparent solar cells, and eco-friendly circuits that reduce global e-waste. !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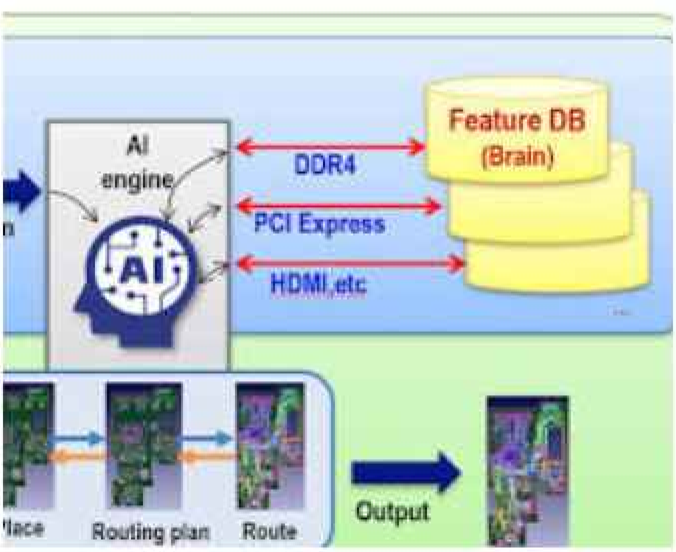
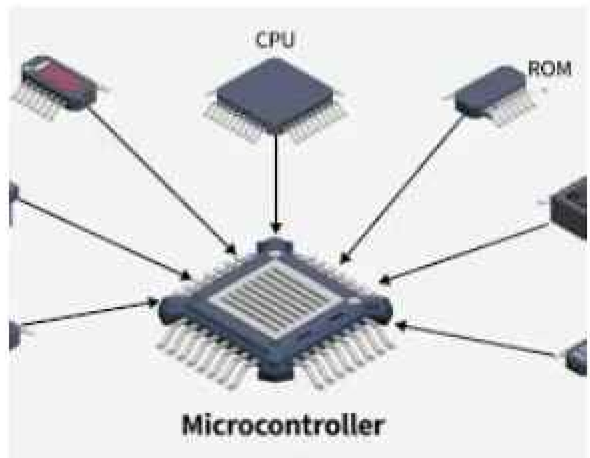


3) Artificial Intelligence (AI)

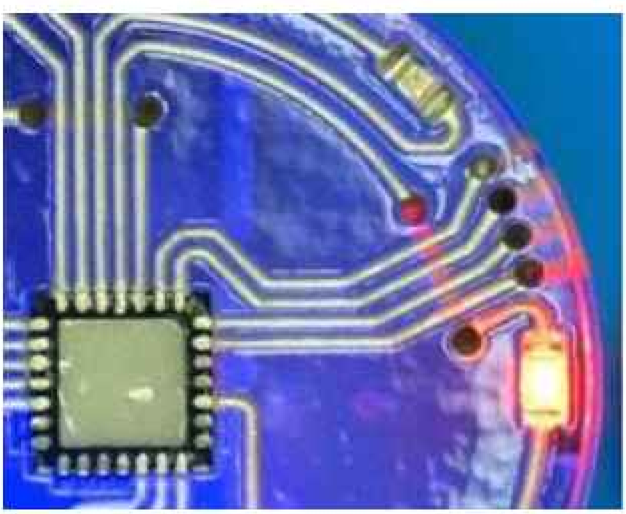
AI is revolutionizing electronics by automating complex PCB designs and identifying microscopic defects during manufacturing. Startups are now using AI to find the best components and generate schematics with a single click, drastically reducing development time. !

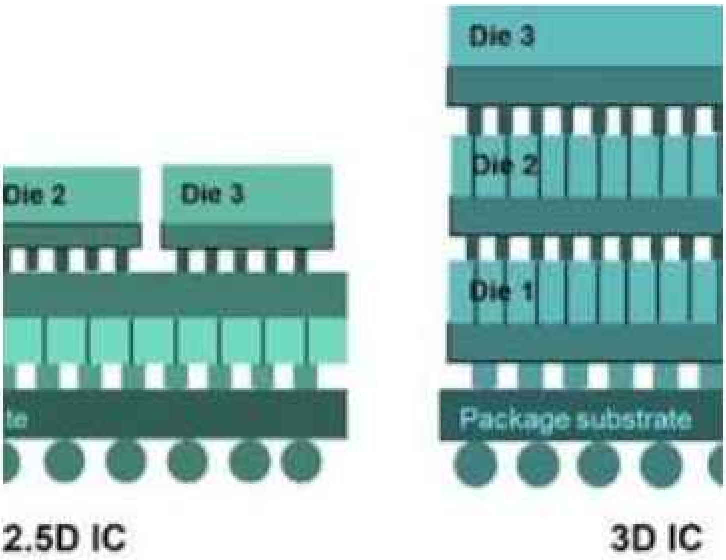
4) Internet of Things (IoT)
The IoT boom requires highly integrated, low-cost chips that combine RF and digital functions. Current research focuses on creating tiny CMOS-based sensor nodes and seamless 5G/LTE communication systems for a fully connected world. !

5) Embedded Systems
Modern embedded systems now feature processor-level security to block network attacks in real-time. Innovations like open-source orchestrators allow microcontrollers to work independently while communicating seamlessly in distributed architectures. !



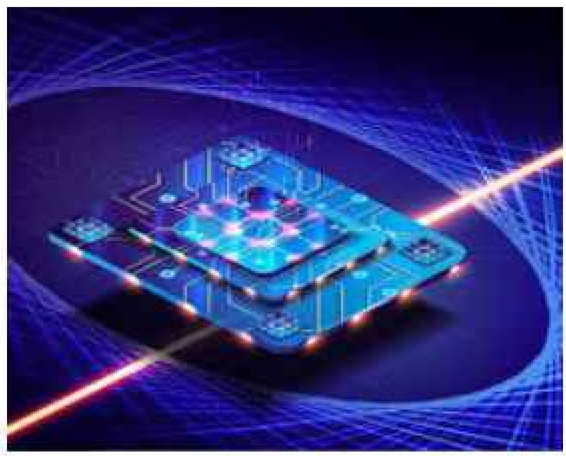
6) Printed Electronics
By using conductive inks and 3D printing, manufacturers can print circuits on flexible films or rigid carriers at a lower cost. This "Hybrid Printed Electronics" approach reduces the carbon footprint and enables electronic integration into clothing and healthcare devices. !



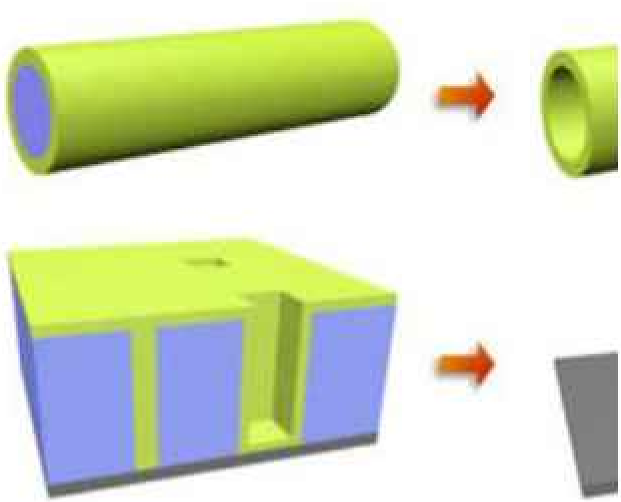


7) Advanced IC Packaging
As Moore's Law slows down, the focus has shifted to 3D chip stacking and Photonic Integrated Circuits (PICs). Advanced packaging allows multiple complex devices to be packed into a single miniaturized module, improving yield and customization. !

8) Miniaturized Electronics
Research in Atomic Layer Etching (ALE) is enabling the manufacturing of nanostructures below 20nm. This miniaturization allows for ultra-compact sensors and high-speed devices that consume significantly less energy. !



9) 3D Printing (Additive Manufacturing)
3D printing allows for the fabrication of electronic components as a single, continuous part without the need for traditional assembly. This trend supports in-situ printing of optics and multi-material nanodevices with atomic precision. !



10) Immersive Technologies (AR/VR)

Augmented Reality (AR) toolkits are being used on assembly lines to help engineers inspect and debug PCBs in real-time. By overlaying digital designs onto physical boards, AR eliminates human error and speeds up the manufacturing workflow. !

SECTION V -VICTORY FILES 2024-25

A record of every win, big or small

CELEBRATING EXCELLENCE: RESEARCH PLACEMENTS & ALUMNI LEGACIES

The Research Pillars

Upgrade Skills via AICTE Quality Improvement Programmes

Completed Ph.D. (Electronics Engg.) degree

Prof.Dr.B.V.Patil Assistant Professor
E & TC Department

Prof.Dr.V.V.Patel Assistant Professor
E & TC Department

Prof.Dr.A.B.Jayaswal
Assistant Professor
E & TC Department

Prof.Dr.P.M.Goad
Assistant Professor
E & TC Department

"The Making of Tomorrow"Students E&TC

Bridge to Industry: Theory Meets Practice

Industrial Visit of the E&TC Department

Industrial Visit at Shivananda Electronics Pvt. Ltd., Deolali, Nashik

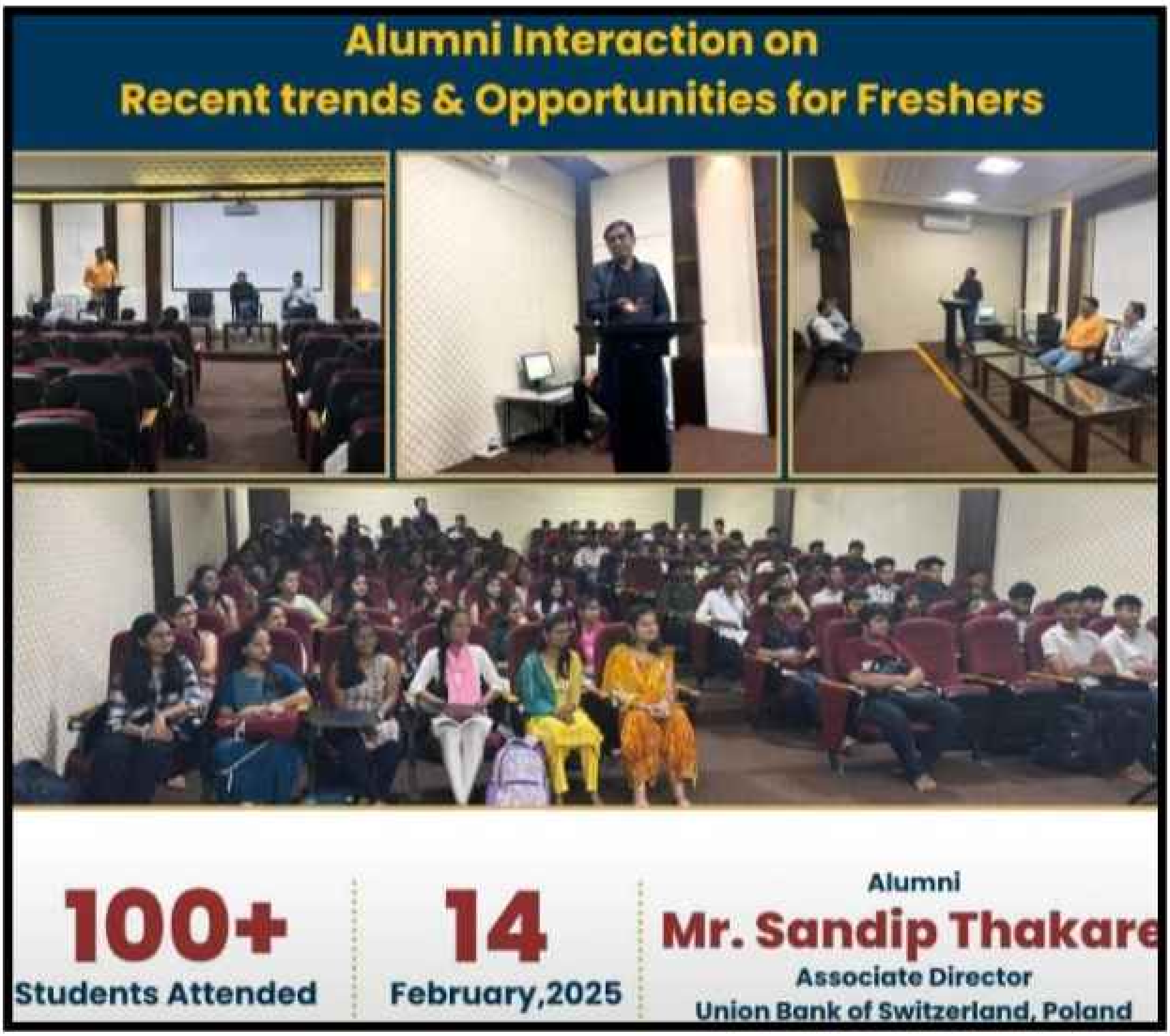
"The Career Blueprint: Train, Present, Prevail."

The Alumni Edge
(Success & Mentorship)

"Alumni are the mirrors in which the current students see their own future possibilities."

"Success isn't just about reaching the top; it's about reaching back to pull others up with you."

"Alumni sessions are where the blueprints of the classroom meet the complexities of the industry."



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