VTECH VOL 13 ISSUE 1 2025

VTECH

INTELLIGENCE IS THE ABILITY TO ADAPT.

"The main aim of education should be to develop character, mental strength, and a spirit of philanthropy."

INDEX

- Vision
- Mission
- PEOs & PSOs
- Result Analysis
- Activities
- Achievements
- Students Corner
- Editorial Team

Editorial Team:

Mrs. Sheetal Kokate (Faculty)

Saurabh Panchal (Student)

Radha Kharat (Student)

Contact us at:

Vespolytechnic_0004

VESP-Diploma Engineering

VTECH

DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION

VISION:

To promote excellence in Tele-communication & Information Technology education and prepare our students to face fast growing challenges of the competitive world

MISSIONS:

- To provide excellent education by balancing both theoretical and practical aspects of Tele-communication Engineering.
- Department is dedicated to equip students with strong foundation to enable them for continuing education.
- To promote Professional skills, Ethical and Spiritual values resulting in service to the community

INTELLIGENCE IS THE ABILITY TO ADAPT.

PROGRAM EDUCATIONAL OUTCOMES

- Engage in testing, operating and maintaining systems in the field of Electronics & Tele-Communication engineering and allied engineering industries.
- Provide socially responsible, environmental friendly solutions for broad-based problem by applying the knowledge of Electronics & Tele-Communication engineering or pursue higher education
- Work effectively as individuals and as team members in multidisciplinary environments
- Engage in lifelong learning, career enhancement and adapt to changing Professional and societal needs

PROGRAM SPECIFIC OUTCOMES

- Electronics and Telecommunication Systems maintain various types of Electronics and Telecommunication systems.
- EDA Tools Usage: Use EDA tools to develop simple Electronics and Telecommunication engineering related circuits.

DEPARTMENTAL AREAS OF SPECIALIZATION :

- Embedded System
- Mobile & Wireless Communication
- Entrepreneurship Development & Startups
- Advanced Power Electronics
- IOT Applications
- Emerging Trends in Electronics
- Computer Networks and Data Communication
- Optical Network and Satellite Communication
- Automation & PLC
- Drone Technology
- VLSI applications

MOU's:

- PRACHI ELECTRONICS
- JOHN GALT INTERNATIONAL
- RASHTRIYA CHEMICALS AND FERTILIZERS LTD
- CLEAR POINT INSTRUMENTATION PVT. LTD
- ANUP ENGINEERING & ALUMINIUM INDUSTRIES
- SHRISTI WIRELESS SOLUTIONS

INTELLIGENCE IS THE ABILITY TO ADAPT.

RESULT ANALYSIS
2025-26

EJ T.Y

YADAV ATHARVA SHIVPRASAD
89.29%

DHALE JAYDATTA JANARDHAN
88.53%

JEETARWAL DEEPAK MOOLCHAND
87.82%

EJ S.Y

GUPTA KESAR ANANTLAL
90.33%

TURBHEKAR NIMESH PRADEEP
83.83%

KEER SARVESH SUMANT
81.50%

EJ F.Y

PATKAR NEIL VIVEK
91.41

SPANDANA PRASHANT NALAWADE
88.88

PAWAR SAHIL AJIT
83.35

INTELLIGENCE IS THE ABILITY TO ADAPT.

STUDENT'S ACTIVITIES

GUEST LECTURE

Expert Lecture A.Y.2024-25							
Sr. No.	Date	Program code	Course name	Topic	Name of Expert	Designation	Organization
1	17/02/2025	EJ6I	CND	AI Powered Autonomous Networks	Mr.Monu Shetty	Chief Operating Officer	Axenous

STUDENT'S ACTIVITIES

INDUSTRIAL VISIT

Sr. No.	Date	Program Code	Industry Name
1	03/04/2025	EJ4K	Prachi Electronics
2	17/03/2025	EJ4K	Maharashtra Nature Park
3	15/03/2025	EJ2K	Gram panchyat Dapoli
4	04/03/2025	EJ4K	Anup Engineering
5	21/02/2025	EJ2K	Group Gram Panchayat,Taharpur,shahapur
6	13/02/2025	EJ4K	Rishabh Instruments Ltd.
7	13/02/2025	EJ4K	Cognifront
8	13/02/2025	EJ6I	Cognifront
9	13/02/2025	EJ6I	Rishabh Instruments Ltd.


अनुप इलेक्ट्री-मेक इंडस्ट्रीज

STUDENT'S IN OTHER ACTIVITIES

Academic Year 2024-25 (Co-Curricular)					
Name of student	Event	Details	Organize by	Date	Achievement
Hrushikesh Karve , Owais Khan , Sara Khanvilkar ,Jayesh Tate	State Level Project Competition	NEXTECH	ST. Xavier's Technical Institute	20/03/2025	1st Rank
Deepak Jeetarwal	Idea Presentation	Eureka 2025	SIESGST	24/01/2025	1st Rank
Sunil Kumar Mohanty, Jaydatta Dhale, Deepak Jeetarwal, Yash Kothavade	Institute Level Project Competition	Vivek Technotronix 2025	Vivekanand Education Society's Polytechnic	21,22/03/2025	1st Rank
Rasika dorugade,Hrishikesh Chinchkar,Mandar Kadam,Surbhi Kanaskar	Institute Level Project Competition	Vivek Technotronix 2025	Vivekanand Education Society's Polytechnic	21,22/03/2025	2nd Rank
Vedangee Bhagat,Sairaj Dhuttargaon,Shruti Darvesh,Daksh Gulati	Institute Level Project Competition	Vivek Technotronix 2025	Vivekanand Education Society's Polytechnic	21,22/03/2025	2nd Rank

STUDENT'S IN OTHER ACTIVITIES

Sara Khanvilkar,Owais Khan,Hrushikesh Karve,Jayesh Tate	National Level Project Competition	ELECTROWIZ 25	Datta Meghe College of Engg.	29/03/2025	Second
Jaydatta Dhale,Sunil mohanty,Deepak Jeetarwal,Yash Kothavade	National Level Project Competition	ELECTROWIZ 25	Datta Meghe College of Engg.	29/03/2025	Third
Daksh Gulati,Mandar Kadam,Parth Pethe	State Level Embedded circuit Designing	Embedded Arena	Vidhyalankar Polytechnic	03/07/2025	2nd Rank
Jaydatta Dhale,Deepak Jeetarwal,Sunil Mohanty,Yash Kothavade	State Level Project Competition	APCOER TECHNOTHON-2025	Anantrao Pawar College of Engg. and Reaserch,Pune	25 & 26 March 25	Third Rank

Daksh Gulati, Mandar Kadam, Parth Pethe won 2nd Rank at Embedded Arena -State Level Embedded circuit Designing at Vidhyalankar Polytechnic

Sunil Kumar Mohanty, Jaydatta Dhale, Deepak Jeetarwal, Yash Kothavade won 1st Rank at Vivek Technotronix 2025 Institute Level Project Competition at Vivekanand Education Society's Polytechnic

Sara Khanvilkar, Owais Khan, Hrushikesh Karve, Jayesh Tate won Second prize at ELECTROWIZ 25 National Level Project Competition at Datta Meghe College of Engg.

Jaydatta Dhale, Sunil Mohanty, Deepak Jeetarwal,Yash Kothavade Won Third P ELECTROWIZ 25 National Level Project Competition at Datta Meghe College of Engg.

Sara khanvilkar represented VES Polytechnic at Jio World centre in Debate competition organised by Hindustan Times on account of their 100th year anniversary

Hrushikesh Karve , Owais Khan , Sara Khanvilkar ,Jayesh Tate got 1st rank at NEXTECH at State Level Project Competition at ST. Xavier's Technical Institute .

International Journal of Research Publication and Reviews Vol ( ) Issue ( ) (2021) Page 000
International Journal of Research Publication and Reviews
Journal homepage: www.ijrpr.com ISSN 2582-7421

Yash Kothavade. Tel.: +91 72489 47233.
E-mail address: yashkothavade31@gmail.com

SoC Designing for Portable Robotic Applications

Mrs.Deena Shah, Jaydatta Dhale2, Deepak Jeetarwal3, Sunil Kumar Mohanty4, Yash Kothavade5

Head Of Department, Electronics and Tele-communication Engineering, V.E.S Polytechnic, Sindhi Society, Chembur, Mumbai – 400071, India
2,3,4,5Students, Electronics and Tele-communication Engineering, V.E.S Polytechnic, Sindhi Society, Chembur, Mumbai – 400071, India

ABSTRACT

This paper presents the design and implementation of an autonomous robotic table-cleaning system based on System-on-Chip (SoC) technology, utilizing logic gate-based control instead of traditional microcontroller programming. The robotic cleaner is designed for office automation, smart workspaces, and industrial applications, using infrared (IR) sensors for edge detection and obstacle avoidance [7]. The Renesas SLG47105V GreenPAK SoC enables low-power real-time decision-making, reducing power consumption while ensuring efficient operation [1]. The system incorporates a tank-style movement mechanism powered by two DC motors, allowing for smooth and precise navigation [9]. By eliminating complex AI-driven path planning, this project presents a cost-effective and scalable automation solution for small-scale surface cleaning [4]. This paper details the hardware architecture, sensor integration, power management, motor control, and system performance. The results demonstrate the effectiveness of the system in avoiding obstacles, navigating efficiently, and performing automated cleaning operations, establishing its feasibility for future smart automation solutions [3].

Keywords: System-on-Chip (SoC), Autonomous Robotics, GreenPAK SLG47105V, Edge Detection, Obstacle Avoidance, Infrared Sensors, Tank-Style
Movement, Embedded Systems, Low-Power Automation.

1. Introduction

Automation is becoming an essential part of modern-day workplaces, with an increasing demand for autonomous cleaning solutions [6]. While robotic

vacuum cleaners have gained popularity, their reliance on AI-based navigation and expensive hardware components makes them less feasible for table-
cleaning applications [5]. Office workstations, libraries, and research labs require compact and cost-effective autonomous solutions to maintain hygiene

with minimal human intervention [4].
This project introduces an SoC-based autonomous robotic cleaner that utilizes logic gate programming instead of traditional firmware-based microcontroller
coding [1]. The system integrates infrared sensors for edge and obstacle detection and operates with a predefined logic-based control mechanism. Using
Renesas SLG47105V GreenPAK SoC, the design ensures low-power consumption, compactness, and real-time decision-making without relying on complex
software algorithms [8].

1.1. Objectives

The primary objectives of this project include:
1. Developing an efficient, compact, and cost-effective robotic cleaner.
2. Implementing IR sensor-based edge detection and obstacle avoidance [7].
3. Designing a tank-style movement system for smooth and stable navigation [9].
4. Utilizing a logic gate-based SoC instead of a traditional microcontroller [1].
5. Optimizing battery life and power efficiency for extended runtime [10].

5Yash Kothavade. Tel.: +91 72489 47233.
E-mail address: yashkothavade31@gmail.com

International Journal of Research Publication and Reviews Vol ( ) Issue ( ) (2021) Page 000

2. Distinctive Approach and Innovation

Unlike traditional robotic cleaning systems that rely on AI-based path planning and computationally intensive algorithms, our approach leverages a purely logic gate-based navigation system. This significantly reduces computational complexity, power consumption, and system costs while ensuring efficient real-time obstacle avoidance and edge detection [8].
Existing robotic cleaners, such as Roomba and Dyson 360, use Simultaneous Localization and Mapping (SLAM), LiDAR, or camera-based AI systems to navigate and optimize cleaning patterns [5]. While effective, these systems require high processing power, expensive sensors, and continuous software updates [4].

Unlike traditional systems, this project:

1. Eliminates AI-driven navigation by implementing a predefined logic-based control mechanism using the Renesas SLG47105V GreenPAK SoC [1].
2. Reduces power consumption by using a low-power SoC instead of a general-purpose microcontroller or embedded AI system [8].
3. Simplifies hardware and cost by using infrared (IR) sensors for edge and obstacle detection instead of LiDAR or vision-based systems [7].
4. Optimizes movement efficiency with a tank-style navigation mechanism, improving manoeuvrability on flat surfaces like office tables [9].

By adopting a logic-controlled approach rather than software-based AI path planning, our robotic cleaning system offers a cost-effective, energy-efficient, and scalable automation solution, making it ideal for small-scale office and industrial applications. [4]

3. System Design and Architecture

The SoC-based robotic cleaning system is designed with three primary modules: sensing and navigation, processing, and actuation. Each module plays a crucial role in ensuring the robot can efficiently navigate, detect obstacles, and perform cleaning tasks autonomously.

Fig. 1 - Imaginary Picture of Body of SoC Robot.

The sensing and navigation module comprises three infrared (IR) sensors that detect table edges and obstacles, preventing the robot from falling or collidingwith objects. The processing unit, built around the SLG47105V GreenPAK SoC, processes sensor input and generates movement commands using logic gate-based decision-making. Finally, the actuation system consists of two DC motors connected to a tank-style drive mechanism, allowing precise movement and direction control.

3.1. Block Diagram

The system's architecture is structured to optimize efficiency, power consumption, and navigation accuracy. The block diagram consists of:

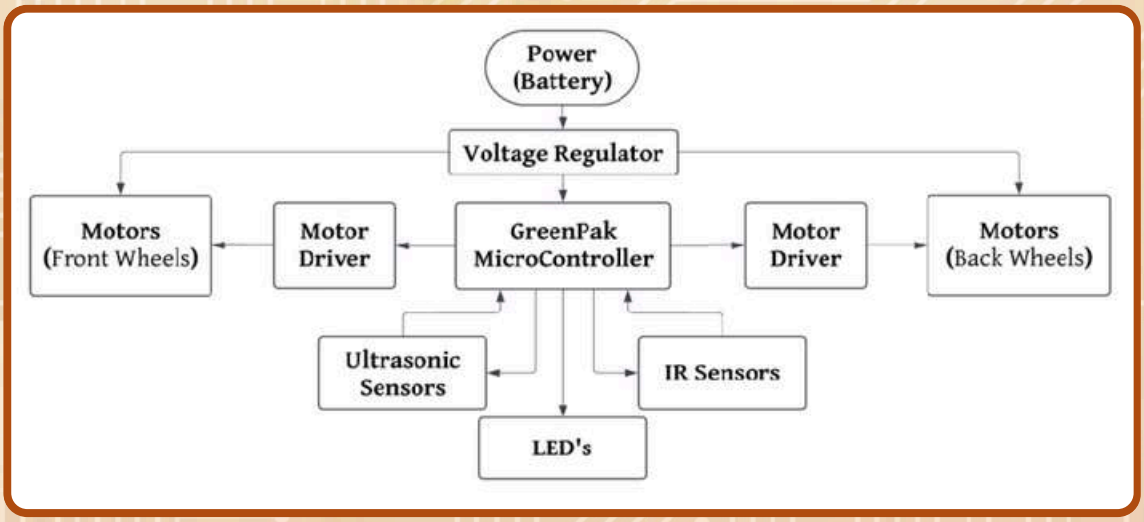


Fig. 2 - Functional Block diagram of the Robotic System

- Sensing and Navigation Module – IR sensors detect table edges and obstacles, ensuring safe operation.
- Processing Unit – The SLG47105V GreenPAK SoC receives sensor input and generates appropriate motion commands.
- Actuation System – Two DC motors with a tank-style drive system move the robot based on processed control signals.

Table 1 - Functional Components of the Robotic System. Component Function

SLG47105V SoC	Controls logic-based decision making
IR Sensors (x3)	Detects obstacles (front) and edges (downward)
DC Motors (x2)	Enables tank-style movement
Motor Driver	Controls motor speed and direction
Battery (12V)	Provides power to the system
Toggle Switch	Manually starts/stops the robot

4. Software Implementation & Logic Building

The logic control of the robotic system is implemented using the Go ConfigureTM Software by Renesas, which allows programming of SLG47105V GreenPAK SoC using logic gates instead of traditional microcontroller coding. Instead of writing complex C or Python code, the system is designed using a graphical logic circuit approach, where components like AND, OR, NOT gates, flip-flops, timers, and PWM generators are configured to control motor operation and sensor responses.

A. The logic is built as follows:

1.Sensor Inputs: IR sensors detect obstacles or table edges, sending signals to the SoC [2]. 2.Decision Making: Logic gates process sensor data to determine movement actions. 3.Motor Control: Based on the logic output, the motor driver receives commands to move forward, stop, or turn accordingly. 4.Tank-Style Movement Implementation: Conditional logic enables one motor to stop while the other rotates, ensuring precise directional control. 5.Power Optimization: The logic gates are structured to minimize power usage, keeping the system efficient and responsive.

This hardware-level programming approach eliminates the need for traditional firmware updates, making the system more stable, power-efficient, and easier to modify for future enhancements.

International Journal of Research Publication and Reviews Vol ( ) Issue ( ) (2021) Page 000

5. Software Implementation & Logic Building

Working The hardware design of the robotic system integrates multiple low-power electronic components to ensure efficient operation, real-time obstacle detection, and stable movement control [2]. The sensors, motors, and power system work together to deliver an autonomous cleaning experience [7]

Fig. 3 - SLG47105V GreenPAK Microcontroller Development Kit

A. Sensor-Based Navigation & Edge Detection

Navigation is a critical aspect of this project, as the robot must autonomously detect edges, avoid obstacles, and navigate safely across a tabletop surface [7]. The system uses three infrared (IR) sensors positioned to enhance accuracy and response time.

1. Two downward-facing IR sensors continuously scan the surface and detect any sudden changes in height, preventing the robot from falling off table edges [7].
2. One front-facing IR sensor identifies obstacles in the robot's path and triggers a turning manoeuvre to avoid collisions [3].
3. To ensure precise detection, the IR sensors are calibrated to operate within a predefined range.

Table 2 – IR Sensor Detection Ranges

Sensor Type	Detection Range	Function
Downward IR Sensor	2-5 cm	Detects table edges
Front IR Sensor	5-15 cm	Detects obstacles

By using predefined threshold values, the logic gate-based processing system can instantly respond to obstacles and prevent the robot from moving off an elevated surface.

B. Tank-Style Movement Control

The robot employs a tank-style movement mechanism, which enables it to manoeuvre efficiently in confined spaces [9]. Unlike traditional differential wheeled robots, this system allows for precise turning and controlled movement, making it ideal for small surfaces like office tables.

1. One motor stops while the other continues rotating, allowing the robot to turn in place and change direction smoothly.
2. The L298N motor driver circuit regulates motor speed and direction, ensuring stable movement without abrupt stops or skidding [9].
3. The continuous belt-driven track system ensures uniform movement and prevents slippage on smooth surfaces [9].

This movement system is simple, power-efficient, and highly reliable, making it ideal for small-scale cleaning applications.

International Journal of Research Publication and Reviews Vol ( ) Issue ( ) (2021) Page 000

6. Functional Overview of Hardware Components

A. SLG47105V GreenPAK SoC:

Acts as the central processing unit, executing logic gate-based decision-making for motor control and sensor responses. It eliminates the need for traditional microcontroller programming, enabling low-power real-time automation.

B. IR Sensors (x3):

Two downward-facing IR sensors detect table edges to prevent falls, while one front-facing IR sensor detects obstacles and triggers directional changes. These sensors ensure safe navigation and collision avoidance [2].

C. DC Motors (x2):

Drive the tank-style movement system, enabling precise control and manoeuvrability. One motor stops while the other rotates to allow turning, ensuring smooth navigation on flat surfaces.

D. Motor Driver (L298N):

Controls the speed and direction of the DC motors based on commands from the SoC. It regulates current flow to prevent damage and ensure efficient power distribution.

E. Battery (12V Lithium-Ion):

Supplies power to all components, ensuring long operational life. It is chosen for high energy efficiency, compact size, and stable voltage output, making it ideal for portable robotics.

F. Toggle Switch:

Provides a manual on/off control for the robotic system, allowing users to start and stop the robot without software intervention. This ensures simplicity and ease of operation.

G. Chassis & Tank Belt Mechanism:

The 3D-printed chassis houses all components, providing structural stability. The tank-belt system enables smooth, skid-free movement, allowing the robot to turn with high precision. Scale

7. Merits and Demerits

A. Merits :

The "SoC Designing for Portable Robotic Application" offers several advantages that make it a viable solution for autonomous cleaning automation. One of the key benefits of this system is its low power consumption, as it employs a System-on-Chip (SoC) instead of a traditional microcontroller, reducing the overall energy usage while maintaining high efficiency. The robot is also compact and lightweight, making it suitable for small-scale automation applications in office environments, research labs, and smart workstations. The tank-style movement system ensures efficient and precise navigation, allowing smooth turns and movement across flat surfaces. Additionally, the project remains cost-effective, as it eliminates the need for AI-based navigation and expensive path-planning algorithms, instead relying on logic gate-based control, which reduces hardware complexity and overall cost

Key Merits:

1.Low Power Consumption: Uses an SoC instead of a power-hungry microcontroller.

2.Compact & Lightweight: Suitable for small-scale office automation.

3.Efficient Movement: Tank-style drive ensures smooth navigation.

4. Cost-Effective: Eliminates expensive AI-based path-planning

B. Demerits :

Despite its advantages, the robotic cleaner has certain limitations that need to be addressed in future iterations. One of the primary constraints is that it is limited to flat surfaces, meaning it cannot function efficiently on rough terrains, carpets, or irregular surfaces. The use of IR sensors for navigation poses challenges in reflective environments, as highly reflective surfaces such as glass or polished tabletops can cause misreadings. Additionally, since the system follows a pre-defined logic-based approach, it lacks AI-based adaptability, meaning it cannot learn or optimize cleaning paths dynamically, restricting its flexibility in more complex environments.

Key Demerits:

1. Limited to Flat Surfaces: Cannot function efficiently on rough terrains.
2. IR Sensor Limitations: Performance varies on reflective surfaces.
3. No AI-based Adaptability: Follows pre-defined logic instead of learning patterns.

8. Challenges Faced

A. Challenges Encountered During Development

The development of this project posed several technical challenges that required careful consideration and iterative troubleshooting. One of the primary challenges was sensor calibration issues, as IR sensors exhibited variations in readings based on environmental conditions, requiring careful tuning and placement for accurate edge detection and obstacle avoidance. Power management was another concern, as ensuring stable power delivery without excessive energy drain was crucial for maintaining efficiency. The tank-style navigation system required extensive motor speed adjustments to ensure smooth turning and manoeuvrability. Lastly, designing a compact yet functional PCB layout in Altium Designer was a challenge, as it required optimal component placement to minimize signal interference and maximize circuit efficiency.

9. Results and Performance Analysis

The autonomous robotic cleaning system was tested in a controlled environment to evaluate its navigation efficiency, sensor accuracy, power consumption, and cleaning effectiveness [6]. The results demonstrate that the logic gate-based control mechanism provides a stable and efficient alternative to AI-driven robotic navigation.

A. Sensor Accuracy & Edge Detection

1. The downward-facing IR sensors successfully detected table edges with an accuracy of 92%, ensuring safe navigation without falling [7].
2. The front-facing IR sensor correctly identified obstacles within a range of 5-15 cm with an accuracy of 88% [3].

B. Movement Efficiency & Manoeuvrability

1. The tank-style movement mechanism allowed smooth directional changes with a response time of <1 second when detecting an obstacle.
2. The robot completed a full cleaning cycle of a standard office table (120 cm x 60 cm) in 3 minutes, demonstrating efficient surface coverage.

C. Power Consumption & Battery Life

1. The system operated on a 12V lithium-ion battery, consuming only 1.5W during normal operation [10].
2. The robot achieved an average runtime of 4.5 hours per full charge, making it suitable for multiple cleaning sessions without frequent recharging

D. Cleaning Effectiveness

1. The bristle-based cleaning mechanism effectively removed 90% of dust and debris from a flat surface, validating the system's cleaning efficiency

International Journal of Research Publication and Reviews Vol ( ) Issue ( ) (2021) Page 000

E. Summary of Results :

Table 3 - Performance Evaluation of the Autonomous Robotic Cleaning System.

Parameter	Performance Output
Edge Detection Accuracy	92% (Downward IR Sensor)
Obstacle Detection Accuracy	88% (Front IR Sensor)
Navigation Response Time	<1 Second
Cleaning Time per Table	~3 Minutes
Power Consumption	1.5W Average usage
Battery Life	~4.5 Hours per charge
Cleaning Efficiency	90% Dust removal

10. Future Work

While the current system successfully implements autonomous cleaning with sensor-based navigation and SoC-based logic control, there are several areas where future enhancements can improve its efficiency, adaptability, and usability.

1. Integration of IoT Connectivity: The robotic cleaner can be upgraded with Wi-Fi or Bluetooth connectivity, enabling real-time monitoring and

control via a mobile app or cloud-based dashboard. This would allow users to schedule cleaning tasks remotely and track performance metrics.

2. AI-Based Navigation and Path Optimization: Future iterations can incorporate AI algorithms for adaptive cleaning patterns, allowing the robot to

3. Enhanced Sensor Fusion for Improved Accuracy: Although IR sensors effectively detect edges and obstacles, adding ultrasonic sensors, LiDAR, or vision-based systems can improve precision and reliability, especially on reflective or dark surfaces where IR sensors may struggle.

4. Battery Life Optimization: Implementing advanced power management techniques such as low-power sleep modes and energy-efficient motor control can increase battery life and extend operating time per charge. Additionally, solar charging integration could provide a self-sustaining power source for extended use.

5. Modular Cleaning Attachments: In future versions, interchangeable cleaning attachments such as vacuum-based dust collectors or wet cleaning pads can be incorporated, making the system versatile for different types of surfaces.

6. Improved Structural Design and Miniaturization: Reducing the overall size and weight of the robot while maintaining its structural strength and durability can enhance its mobility and cleaning efficiency, allowing it to navigate smaller and more complex workspaces. By implementing these advancements, the autonomous table-cleaning robot can evolve into a more intelligent, efficient, and multi-functional cleaning

assistant, making it suitable for a wider range of commercial, industrial, and domestic applications.

11. Conclusion

A. The SoC Designing for Portable Robotic Application successfully demonstrates a cost-effective, low-power, and autonomous robotic cleaning
solution that leverages logic gate-based control instead of traditional microcontroller programming. By utilizing Renesas SLG47105V GreenPAK
SoC, the system eliminates the need for firmware-based programming, making it an efficient and scalable alternative to AI-driven robotic cleaners.

International Journal of Research Publication and Reviews Vol ( ) Issue ( ) (2021) Page 000

B. The integration of infrared (IR) sensors ensures precise edge detection and obstacle avoidance, preventing accidental falls and collisions. The tank-
style movement mechanism provides efficient mobility and manoeuvrability, making it suitable for small-scale office and industrial cleaning

applications. The battery-operated design enhances portability and energy efficiency, further extending the system's usability.
C. Experimental results confirm that the robotic cleaner operates reliably in controlled environments, with high accuracy in edge detection, obstacle
avoidance, and power-efficient navigation. The project establishes a foundation for future enhancements, including IoT connectivity, AI-driven path
optimization, and extended battery life.

D. Overall, this project highlights the potential of SoC-based autonomous robotics for smart automation, contributing to the advancement of energy- efficient and logic-driven cleaning systems in modern workplaces

12. Acknowledgement

We sincerely thank Mrs. Deena Shah, Head of the Electronics & Telecommunication Engineering Department, VES Polytechnic, for her invaluable guidance and constant support throughout this project. We also extend our gratitude to Mr. Vikrant Joshi, Principal, VES Polytechnic, for providing the necessary resources and a conducive learning environment. We are grateful to our faculty mentors and the entire teaching and non-teaching staff of VES Polytechnic for their valuable insights and assistance during the project. A special thanks to 3B Semiconductors Pvt. Ltd. and Mr. Sachin Bhalerao for their technical mentorship, which significantly contributed to the project's practical implementation Lastly, we appreciate the encouragement and motivation from our friends, peers, and family, whose support helped us successfully complete this project.

REFERENCES

[1] Renesas Electronics Corporation – "GreenPAK SLG47105V Datasheet," 2023. [Online]. Available: https://www.renesas.com/us/en/document/dst/slg47105-datasheet
[2] Borenstein, J., Everett, H. R., & Feng, L. – "Navigating Mobile Robots: Sensors and Techniques," IEEE Press, 1996.
[3] Broggi, A., Medici, P., Porta, P. P., & Ghidoni, S. – "Obstacle Detection with Stereo Vision for Autonomous Vehicles," IEEE Transactions on Intelligent Transportation Systems, vol. 10, no. 3, pp. 475-485, Sept. 2009.
[4] Schmidt, D., Wang, Y., & Rinner, B. – "A Survey on Automatic Cleaning Robots," IEEE Transactions on Automation Science and Engineering, vol. 15, no. 2, pp. 563-576, April 2018.
[5] iRobot Corporation – "Roomba Vacuum Technology Overview," 2022. [Online]. Available: https://www.irobot.com
[6] Siegwart, R., Nourbakhsh, I., & Scaramuzza, D. – Introduction to Autonomous Mobile Robots, 2nd Edition, MIT Press, 2011.
[7] Wang, Z., Chen, Y., & Dong, J. – "Application of Infrared Sensors in Robotics for Obstacle Avoidance and Navigation," Sensors Journal, vol. 17, no. 8, pp. 1903-1914, 2017.
[8] Kim, H., Lee, S., & Park, J. – "Development of a Low-Power SoC for Autonomous Cleaning Robots," IEEE Embedded Systems Letters, vol. 10, no. 4, pp. 99-103, Dec. 2018.
[9] Li, Z., Zhao, C., & Sun, X. – "Tank-Style Locomotion for Autonomous Mobile Robots," Journal of Mechatronics and Automation, vol. 15, no. 2, pp. 220-234, 2021.
[10] Jang, C., Park, J., & Kim, D. – "Sensor Fusion for Indoor Autonomous Navigation of Small-Scale Cleaning Robots," IEEE Transactions on Industrial Electronics, vol. 67, no. 9, pp. 7892-7905, Sept.

TEACHER'S CORNER

PAPER PUBLISHED		
2024-25		
SR.NO	Name of Staff	Paper Title
1	Mrs. Deena Shah	SoC Designing for Portable Robotic Applications
2	Mrs. Neelima Palaspagar	Power Theft Detection
3	Mrs. Neelima Palaspagar	Fire Fighting Robot
4	Mr. Manish Deshmukh	Multifunctional BLE-BasedTracking System
5	Mrs. Vaishali Rajeshirke	Wireless EV Charging Using Arduino
6	Mr. Nirmala Prabhu	Medicine Reminder Using Arduino
7	Mrs. Sheetal Kokate	Home Automation using Remote Control and Voice Assistant
8	Mr. Ashok Navale	Building Wireless Wheelchair Control System
9	Mr. Ashok Navale	GPS Tracker

STUDENT'S CORNER

Next-Gen 6G Research Survey

A Sharp-Shaped Future of Wireless Communication

As the digital world advances at a rapid pace, the next milestone in wireless communication is already taking shape—6G. Far beyond its predecessor, 6G envisions a future where ultra-fast, intelligent, and context-aware networks transform every aspect of human life. From holographic interactions to brain-machine interfaces, 6G promises to redefine communication itself.

To understand the expectations and readiness of the emerging generation of technologists, a focused research survey was conducted among students, professionals, and researchers from various countries. The data collected highlights both enthusiasm and awareness regarding the technologies that will drive 6G.

STUDENT'S CORNER

Purpose of the Survey

- With 6G expected to be operational around 2030, this survey was designed to:
- Measure awareness of 6G technologies among aspiring engineers and industry professionals.
- Identify the most anticipated features and real-world applications.
- Understand research interests and perceived technological challenges.
- By gathering these insights, the goal was to assess how academic and technical communities are preparing for the transition from today's smart connectivity to the more advanced and intelligent connectivity of tomorrow.

Key Insights from the Survey

1. Expectations from 6G

- Participants were asked what features they associate most with 6G. The top responses included:
- Extremely high data transfer speeds, exceeding one terabit per second
- Real-time holographic communication
- AI-driven, self-optimizing networks
- Seamless augmented and virtual reality experiences
- Integration of satellite and terrestrial communication

These responses suggest that participants view 6G as more than just an upgrade in speed. They see it as a gateway to entirely new modes of communication and digital presence.

STUDENT'S CORNER

2 . Research Areas of Interest

- Respondents showed keen interest in the following domains:
- Terahertz frequency communication
- Artificial intelligence in network optimization
- Cybersecurity and quantum-resistant encryption
- Energy-efficient wireless systems
- Applications of 6G in transportation, urban development, and remote healthcare

This indicates a growing awareness of both the technical depth and interdisciplinary nature of 6G research.

3. Potential Use Cases

- The survey also explored the applications that respondents found most promising:
- Brain-computer interfaces for medical and assistive technologies
- Remote robotic surgeries with near-zero latency
- Holographic education systems enabling global classroom interaction

STUDENT'S CORNER

- Fully autonomous transportation networks
- Smart energy grids and scalable IoT integration

These examples highlight how 6G is expected to influence not just communication, but healthcare, education, and infrastructure at a global scale.

4. Challenges Foreseen

- ·While optimism was evident, participants also acknowledged several challenges
- ·The development of hardware compatible with Terahertz frequencies is still limited.
- ·Global spectrum standardization and regulatory frameworks are uncertain.
- ·Power consumption and environmental sustainability must be addressed.
- ·The integration of AI and quantum computing raises new cybersecurity concerns.

These concerns reinforce the need for international collaboration and long-term strategic research.

STUDENT'S CORNER

Perspectives from Participants

A final-year student in electronics engineering shared:

"6G will go beyond connecting devices; it will connect ideas, emotions, and realities across boundaries."

A telecom professional emphasized:

"Security will be the key challenge. With AI and quantum technologies entering the network space, new risks will emerge that we haven't faced before."

Such reflections underscore the idea that 6G is not merely a technological upgrade but a paradigm shift in how humans will interact with information and each other.

Written by:

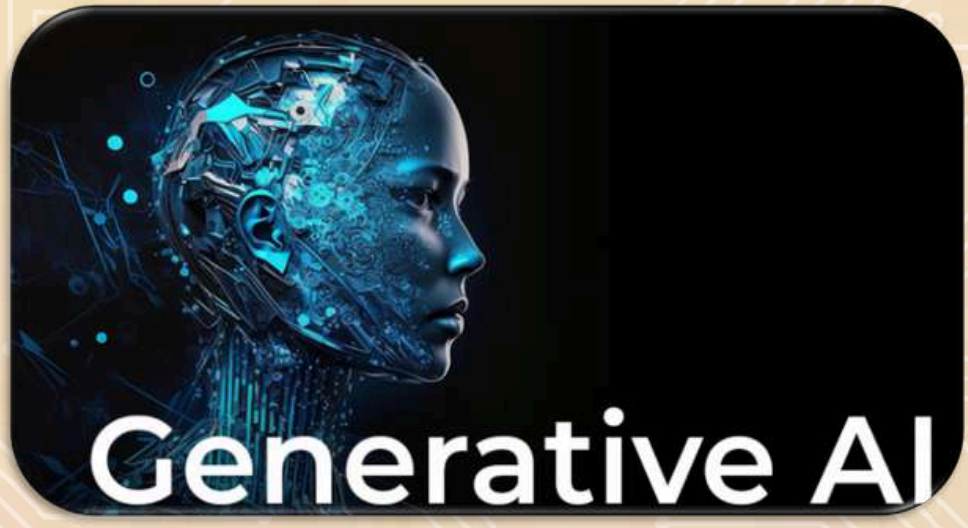
Shreya Jadhav
EJ2K

STUDENT'S CORNER

The Future of Generative AI in 2025

What is Generative AI?

Generative AI belongs to a part of artificial intelligence that focuses on making new content with advanced machine learning models – like text, images, music or code. It gives its users mighty tools and algorithms letting them create realistic and imaginative results based on patterns learned from massive datasets. Generative AI takes support from architectures like Generative Adversarial Networks (GANs) or Transformer-based models, where one component generates the content and another evaluates its quality, producing innovative and highly accurate outputs.



STUDENT'S CORNER

Current State of Generative AI

Generative AI has become one of the most exciting technologies out there, capable of creating original content. It's being used in millions of applications around the world, changing industries and driving innovation. Here are some of the key features of generative AI:

Content Creation: Generative AI can create images and videos that look real with just a few prompts. GPT-3 and DALL·E have changed content creation for businesses and creators so they can produce great content fast.

Natural Language: AI models for natural language processing can understand and generate human text. These models are great for writing articles, summarizing documents and conversing. Current chatbots are advanced enough to have human-like conversations with users.

Creative Help: AI helps in creative processes, helping artists, designers and musicians generate ideas, automate tasks and create new forms of creative work, speeding up production and expanding possibilities.

Customization and Personalization: Generative AI can create custom content by analyzing user preferences. For example, custom chatbots in healthcare can give patients easy access to care and treatment tailored to their needs.

Data Augmentation: In machine learning, generative AI can generate synthetic data to top up real world datasets, so models can be trained in areas where there's limited data.

STUDENT'S CORNER

Automation and Productivity: Generative AI can automate tasks like writing reports or generating documents so humans can focus on the hard stuff and be more efficient and error free.

Latest Advancements in Generative AI

The newest version of Generative AI tools includes fresh tools like OpenAI's GPT-4 and Google's Gemini 2.0 bringing several important upgrades, such as:

Multimodal Abilities: These new models handle not just text – but also images, audios and videos – making them more adaptable.

Improved Text Understanding: GPT-4 and similar models grasp and create complex text better, like answering difficult questions or summarizing detailed information. This allows them to respond to users' complex queries in a human like manner.

Speed and Personalization: The newest AI models work faster and use less computing power while giving better results. They also offer more personalization making them useful for specific tasks like marketing and customer support.

Limiting Bias: New models focus more on avoiding biased or harmful content to promote ethical use, especially in sensitive topics.
Interactive Content: AI now creates more engaging content.

STUDENT'S CORNER

Comparison with Other Techniques

Generative AI is a strong tool. To see how it shines let's look at it next to other techniques like Traditional AI, AutoML, Deep Learning Machine Learning and NLP:

Traditional AI: Traditional AI follows set rules and instructions to do certain tasks. It doesn't learn from data – just follows given steps to finish jobs, like finding diseases or managing robots. Unlike generative AI, it doesn't make anything new – it only uses rules to fix issues.

Automated Machine Learning (AutoML): AutoML makes the process of creating machine learning models automatic, helping people with less technical skill train models for different tasks.

Deep Learning: Deep learning is a way in machine learning that uses big, layered networks to find complex patterns in data. It drives many generative AI models like GPT and DALL·E, which use deep learning to make new things.

Machine Learning: Traditional machine learning looks at data to make guesses, like predicting the weather or sorting objects in pictures. It doesn't make new content but searches for patterns in data to make choices.

Natural Language Processing (NLP): NLP is a part of AI that deals with understanding and handling human language. It's used for things like changing languages or studying opinions.

STUDENT'S CORNER

Future Trends and Predictions of Generative AI

Besides what it does now, generative AI will grow with fresh ideas and developments in artificial intelligence. Some of the future trends and expectations for generative AI include:

1. Hyper-Personalization

Generative AI will simplify making services and products unique for each user. It will study user information and likes to craft special experiences, like custom learning paths in education or tailored offers in marketing. This will make interactions more meaningful and exciting.

2. Conversational AI

Generative AI will enhance virtual assistants and customer support tools. These tools will tackle more complicated questions and tasks and understand spoken commands better. This will create more effective customer service and improved user experiences.

3. Multi-Modal AI

Multi-modal AI will handle and comprehend various types of data simultaneously, such as text, images and videos. This will enable more interactive and personalized experiences, like mixing voice and facial recognition for secure logins or providing tailored shopping experiences based on voice and image data.

STUDENT'S CORNER

4. AI for Creative Industries

Generative AI will energize creativity by assisting in creating new content more efficiently. For instance, AI can aid fashion designers in crafting new styles or help media companies produce personalized content for their audiences. This will make creative processes quicker and more adaptable

5. AI Ethics and Regulation

As generative AI becomes more widespread, there will be more focus on using it responsibly. Different countries will create rules to make AI fair clear and respectful of people's rights. This will build trust in AI systems and stop misuse.

6. Intelligent Automation

Generative AI will refine automation by helping machines take smarter actions based on data. In industries like manufacturing, AI can automate tasks like managing inventory or processing orders quickly and accurately. This will make business operations more efficient.

7. Generative AI in Healthcare

In healthcare, generative AI will help create personalized treatment plans from a patient's health data. It will also speed up medical research, like finding new drugs or improving treatments leading to better patient care and outcomes.

STUDENT'S CORNER

8. AI and Cybersecurity

Generative AI will play a key role in improving cybersecurity by spotting potential risks more quickly. AI will analyze large amounts of data in real time to detect and prevent cyberattacks making online systems more secure.

9. Decentralized AI

AI will increasingly work with blockchain technology to create decentralized systems. This will protect users' privacy and store data securely. Decentralized AI will give people more control over their personal data and reduce trust issues.

10. Gaming and Entertainment

Generative AI will make games and entertainment more personal and fun. Developers will be able to create custom storylines and environments for each player. AI will help create bigger and more detailed game worlds and characters faster, making the gaming experience more rich.

The above generative AI trends show how it can change industries by embracing new technologies and evolving to meet the growing needs of users and businesses. As generative AI advances it will unlock new possibilities, enhance creativity and efficiency. With ongoing innovation and improvements generative AI is becoming a must have tool for creating personal, intelligent and impactful solutions across all industries.

STUDENT'S CORNER

Conclusion

Generative AI is changing how we interact with technology. As it does so, it's a tool for businesses, creators and developers across healthcare, entertainment and marketing. It will revolutionize industries, improve content creation and adapt to growing demand so it will be relevant and impactful for years to come.

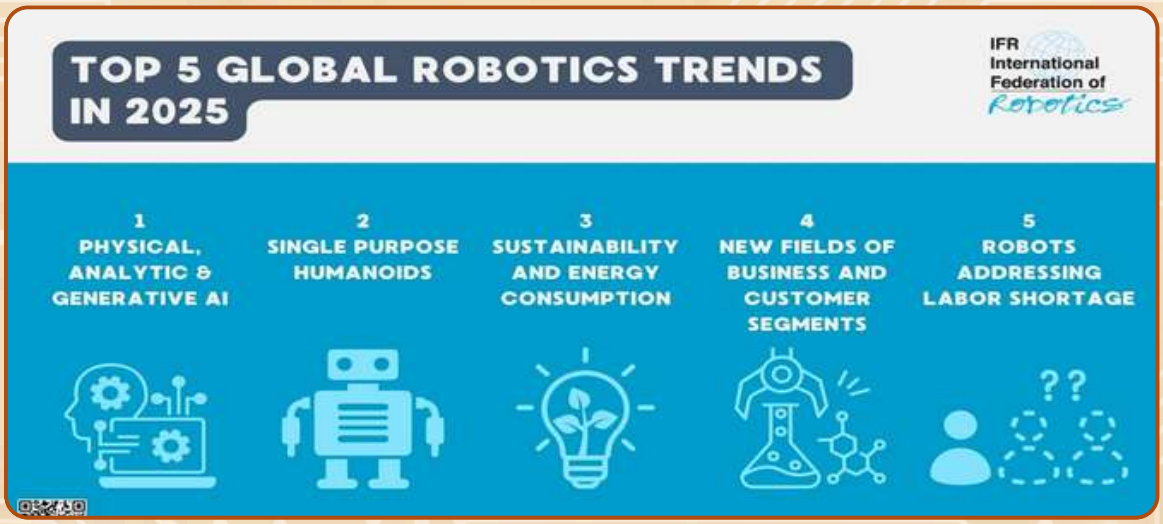
Written by:

Radha Kharat
EJ2K

STUDENT'S CORNER

The Robotics trends in 2025 and beyond

As the 21st century progresses, the field of robotics is rapidly advancing, poised to revolutionise various aspects of daily life, education, and industry worldwide. By 2025 and beyond, these emerging technologies are expected to significantly alter human interaction with machines, enhancing productivity, safety, and even creativity. Both global markets and specific national landscapes, such as India's, are experiencing profound transformations driven by innovation and investment.



STUDENT'S CORNER

1. Physical, Analytic & Generative AI

Overview: This trend highlights the integration of various forms of AI into robotics:
Physical AI enables robots to perform complex tasks involving motion and interaction with the physical environment. Analytic AI processes data to support decision-making and predictive maintenance. Generative AI allows robots to autonomously create new content, designs, or processes (e.g., using large language models or generative design techniques).Impact: More intelligent, autonomous, and adaptable robots that can improve efficiency and innovation across industries.

2. Single Purpose Humanoids

Overview: These are humanoid robots designed for specific tasks rather than general intelligence or multitasking.

Examples: Robots that can perform roles such as receptionist duties, delivery in hotels, or basic customer service.

Impact: Cost-effective and targeted deployment in areas like hospitality, healthcare, and retail, where human-like form and interaction are valuable.

3. Sustainability and Energy Consumption

Overview: A growing emphasis on building energy-efficient and environmentally friendly robots.

STUDENT'S CORNER

Examples:

Use of sustainable materials.
Optimizing energy usage in robotic systems.
Robotics aiding green initiatives (e.g., waste sorting, renewable energy maintenance).
Impact: Supports global climate goals and lowers operational costs.

4. New Fields of Business and Customer Segments

Overview: Robotics is expanding beyond traditional manufacturing into new markets such as: Agriculture, Construction, Healthcare, Logistics, Elderly care
Impact: Opens up new business models and customer bases, making robotics more accessible and impactful across different sectors.

5.Robots Addressing Labor Shortage

Overview: With aging populations and a shrinking workforce in many regions, robots are stepping in to fill labour gaps.
Applications: Warehousing and logistics, Healthcare and elder care, Agriculture and food processing
Impact: Helps sustain economic productivity and service delivery in sectors facing critical human resource shortages

STUDENT'S CORNER

Global Robotics Trends and Market Overview

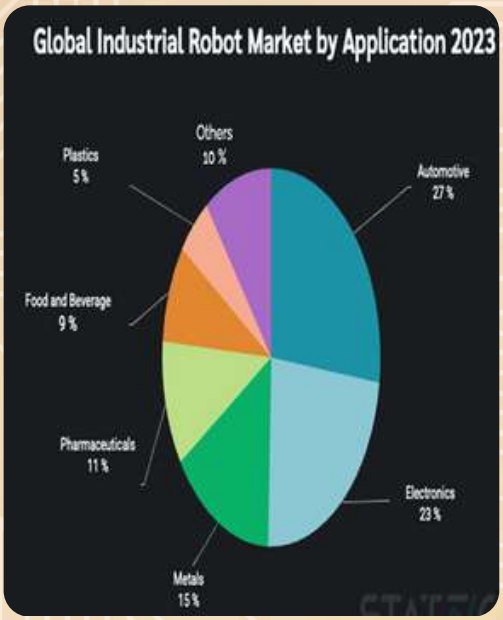
The global robotics sector is characterised by several key technological trends:

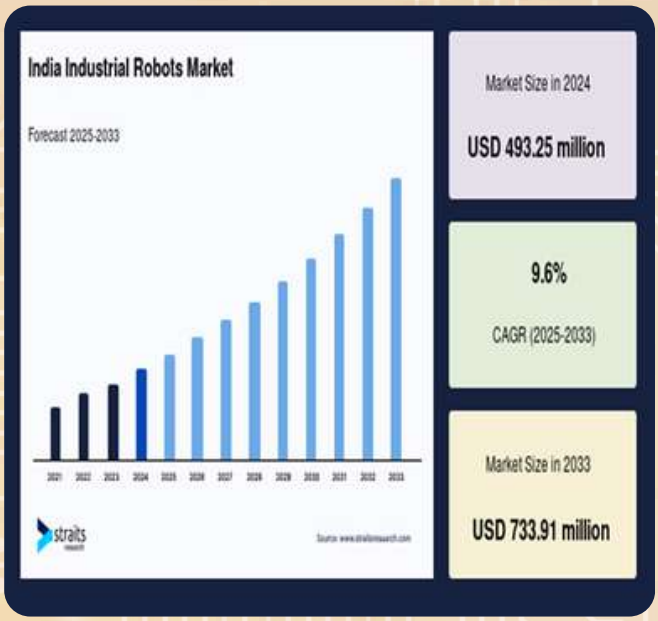
- Autonomous Robotics: These machines, powered by artificial intelligence (AI) and machine learning, are capable of performing tasks without human intervention. Globally, they are streamlining operations in industries like manufacturing and logistics by navigating warehouses, managing inventory, and performing quality control checks with minimal oversight, thereby increasing efficiency and reducing human error. They are also becoming increasingly sophisticated in applications such as drones for delivery services and self-driving vehicles, transforming transportation and logistics.

- Collaborative Robots : are designed to work safely alongside humans, augmenting human capabilities rather than replacing them. This trend is particularly relevant for hands-on learning experiences and in industrial settings where human-robot cooperation can enhance productivity.

- Robots in Everyday Life and Market: The integration of robots into daily life is growing, with household assistants and advanced healthcare robots becoming more commonplace. According to a recent report by the International Federation of Robotics, the market for service robots is expected to grow exponentially, with an estimated 75 million units projected to be in use globally by 2025. This broad integration highlights the significant penetration of robotics into various facets of society

STUDENT'S CORNER





India's Robotics Revolution: Growth, Players, and Penetration

India is rapidly emerging as a significant player in the global robotics landscape, driven by innovations, investments, and a burgeoning ecosystem supporting research and development.

- Market Growth and Investment: The Indian robotics market is projected to grow at an impressive compound annual growth rate (CAGR) of over 20% from 2023 to 2028. This growth is fuelled by a surge in demand for automation solutions across various sectors, including manufacturing, healthcare, agriculture, and logistics. Investment in the sector has seen a remarkable uptick, with venture capital funding reaching approximately $1 billion in 2023 alone.

STUDENT'S CORNER

- **Key Players and Innovations: Major Indian firms are at the forefront of this revolution. Examples include GreyOrange, which specialises in warehouse automation, and Milagrow, known for its humanoid robots. The influx of capital has fostered a vibrant startup ecosystem, with new entrants focusing on niche applications. For instance, Nuro is pioneering developments in autonomous vehicles, while AgriBot focuses on agricultural drones, addressing critical challenges in urban mobility and food security.**

STUDENT'S CORNER

- Key Players and Innovations: Major Indian firms are at the forefront of this revolution. Examples include GreyOrange, which specialises in warehouse automation, and Milagrow, known for its humanoid robots. The influx of capital has fostered a vibrant startup ecosystem, with new entrants focusing on niche applications. For instance, Nuro is pioneering developments in autonomous vehicles, while AgriBot focuses on agricultural drones, addressing critical challenges in urban mobility and food security.

Global Educational Integration.

- Robots are being used as teaching aids to foster interactive learning experiences.
- Programmable robots are introduced in classrooms to teach coding and critical thinking skills, enhancing STEM education.
- Autonomous robots can act as teaching assistants by:
- Providing personalised support
- Grading assignments
- Offering tutoring
- Facilitating collaborative learning projects
- Schools are increasingly incorporating:
- Robotics competitions
- Coding classes

STUDENT'S CORNER

- Programmes that foster innovation and collaboration

Indian Educational Response:

- Educational institutions in India are responding to the demand for robotics skills by:
- Integrating robotics into their curriculum
- Top universities in India offering specialised programmes and research opportunities in robotics and automation:
- Indian Institute of Technology (IIT)
- Indian Institute of Science (IISc)

Workshops and competitions are organised to:

- Inspire students
- Provide hands-on experience
- Preparing students to engage with ethical dilemmas is crucial for:
- Fostering responsible innovation
- The future trends in robotics are expected to create:
- A paradigm shift in how we live, work, and learn

STUDENT'S CORNER

- As robots become more integrated into daily life, the demand for a workforce skilled in robotics and related technologies will grow.
- Educators play a vital role by:
- Fostering curiosity and innovation among students
- India's position in robotics:
- Combining innovative companies, significant investments, and a supportive ecosystem
- Positioned to meet domestic challenges and emerge as a global leader in robotics technology

Written by:

Neil Patkar
EJ2K

STUDENT'S CORNER

The Impact of 5G on Society

The rollout of 5G (fifth-generation) wireless technology is transforming the way we live, work, and connect. Offering faster speeds, lower latency, and massive device connectivity, 5G is expected to power innovations across nearly every sector. However, alongside its many benefits, 5G also brings challenges and concerns that society must address.

STUDENT'S CORNER

The Evolution of Internet Speed

The evolution from 1G to 5G marks a significant journey in the advancement of mobile communication technology. 1G, introduced in the 1980s, was the first generation of mobile networks, offering only analog voice communication with poor sound quality and limited coverage. It was followed by 2G in the 1990s, which brought digital voice, text messaging (SMS), and better security. Then came 3G in the early 2000s, introducing mobile internet, video calling, and higher data speeds, which enabled smartphones to emerge. 4G, launched in the 2010s, revolutionized mobile connectivity with high-speed internet, HD video streaming, and real-time online gaming, laying the foundation for today's app-driven digital world. Now, 5G represents a leap forward, offering ultra-fast speeds, extremely low latency, and the ability to connect millions of devices simultaneously. It is set to power next-generation technologies like autonomous vehicles, smart cities, remote surgery, and immersive AR/VR experiences, making communication faster, smarter, and more integrated than ever before.

STUDENT'S CORNER

The Good: Benefits of 5G

1. Ultra-Fast Internet Speeds 5G networks can be up to 100 times faster than 4G. This enables seamless streaming, instant downloads, and ultra-high-definition video calls. Consumers and businesses benefit from faster, more reliable internet experiences.
2. Support for Smart Cities and IoT 5G supports the massive growth of the Internet of Things (IoT), connecting billions of devices— from traffic lights and utility meters to home appliances and wearable tech. This paves the way for smarter cities, efficient energy use, and improved public services.
3. Enhanced Healthcare Services Telemedicine becomes more effective with 5G, thanks to low latency and high-quality video. Remote surgeries, real-time diagnostics, and wearable health monitors are made possible, especially in remote or underserved areas.
4. Innovation and Economic Growth 5G fuels innovation in industries like transportation, manufacturing, agriculture, and entertainment. Autonomous vehicles, virtual reality, drone deliveries, and factory automation become more viable. This leads to job creation, new markets, and increased economic productivity.
5. Improved Education and Remote Work The COVID-19 pandemic showed the importance of digital infrastructure. 5G enhances virtual classrooms, video conferencing, and cloud collaboration, making education and remote work more accessible and efficient.

STUDENT'S CORNER

The Bad: Challenges and Concerns of 5G

1. Digital Divide While urban areas quickly benefit from 5G, rural and low-income communities often lag behind. This deepens the digital divide and creates inequality in access to education, healthcare, and job opportunities.

2. Privacy and Security Risks With billions more connected devices, the attack surface for hackers increases. If not properly secured, 5G networks could become vulnerable to data breaches, surveillance, and cyberattacks on critical infrastructure.

3. Health Concerns Some people are concerned about the health effects of exposure to 5G radiofrequency radiation. Although current research shows no conclusive evidence of harm within regulated exposure limits, public concern remains, calling for more long-term studies and transparency.

4. Environmental Impact 5G requires new infrastructure, including millions of small cell towers and more energy intensive data centers. This can lead to increased energy consumption and electronic waste unless countered with sustainable practices

STUDENT'S CORNER

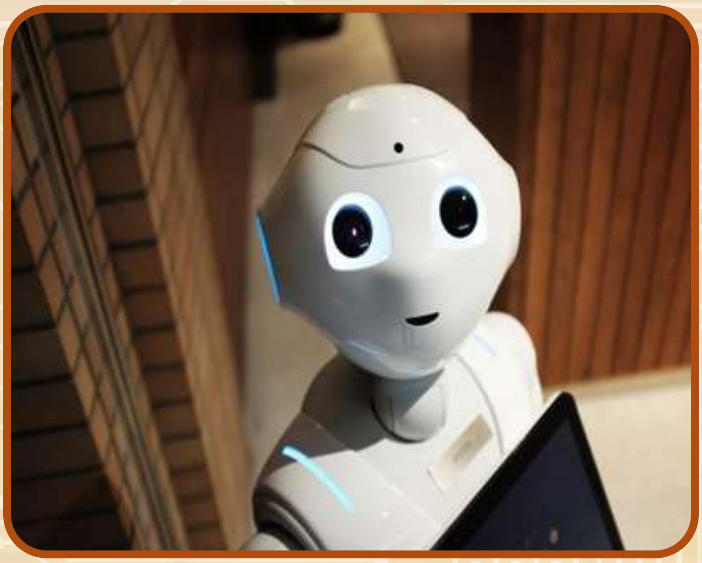
1. Cost and Accessibility

Deploying 5G is expensive. The high costs can make services more expensive for consumers and slow down widespread adoption, especially in developing countries. Businesses may also face high upgrade costs for 5G-compatible systems.

The Future of 5G

The future of 5G is set to revolutionize the way we live, work, and connect. As the technology matures,we can expect widespread global adoption, with high-speed and ultra-low latency networks becoming the backbone of communication infrastructure. 5G will drive the growth of smart cities, autonomous vehicles, remote healthcare, and advanced industrial automation by enabling real-time data transfer and seamless connectivity. The integration of 5G with technologies like Artificial Intelligence, Internet of Things (IoT), and Edge Computing will further enhance efficiency and innovation across sectors. Additionally, businesses will increasingly adopt private 5G networks for secure, high-performance operations. With developments like network slicing and 5G-Advanced, the network will become more flexible and reliable, supporting a wide range of applications from immersive gaming to critical emergency services. While challenges such as high deployment costs, energy consumption, and cybersecurity remain, the transformative potential of 5G ensures it will play a central role in shaping the digital future over the next decade.

STUDENT'S CORNER



Conclusion

5G represents a major technological milestone with the potential to revolutionize society. From powering smart cities to enabling futuristic healthcare, the possibilities are immense. However, its deployment must be handled with care to ensure equitable access, safeguard privacy, address health and environmental concerns, and close the digital gap. For 5G to reach its full potential, a balanced approach is essential—one that maximizes the benefits while actively managing the risks.

STUDENT'S CORNER

Written by:

Vedant Rothe
EJ2K

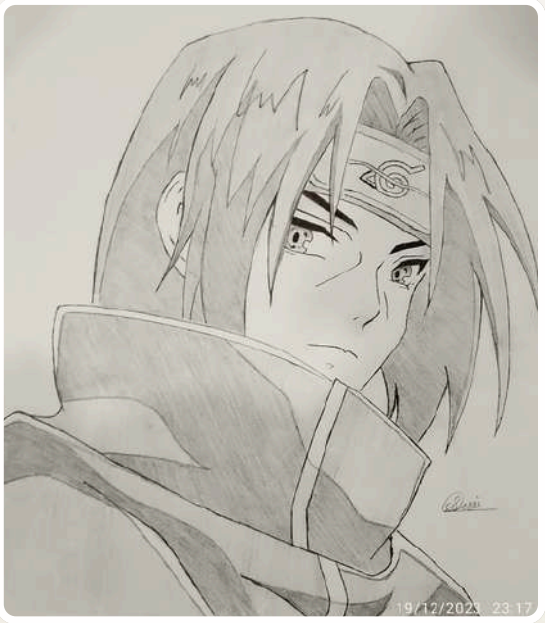
ARTWORKS

{Art by}
Spandana nalawade
EJ2K

{Art by}
Saurabh Panchal
EJ2K

ARTWORKS

Shantanu Desai
EJ6I



ELECTRONICS AND TELECOMMUNICATION

EDITORIAL TEAM

Mrs. SHEETAL KOKATE.
FACULTY INCHARGE

SAURABH PANCHAL

RADHA KHARAT

VIVEKANAND EDUCATION SOCIETY'S

Polytechnic

V.E.S. Since 1962

ELECTRONICS & TELE - COMMUNICATION ENGINEERING

2024- 25

Intelligence is the ability to adapt.