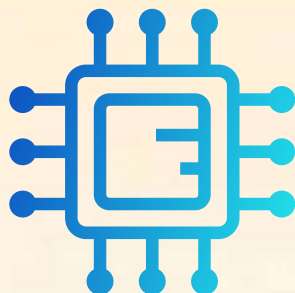




BBDNIIT

Babu Banarasi Das Northern India Institute of Technology



CAMPUS DRONE'25

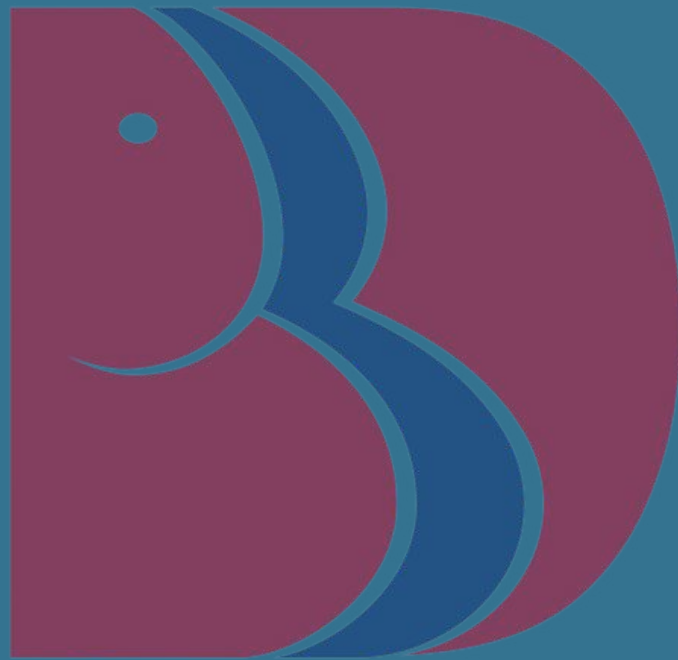
COMPUTER SCIENCE & ENGINEERING DEPARTMENT



Babu Banarasi Das Northern India Institute of Technology

Sector-II, Dr. Akhilesh Das Nagar, Ayodhya Road, Lucknow (U.P.) - 226028, India

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BBDNIIT

NBA ACCREDITATION



we are proud to say that

Babu Banarasi Das Northern India Institute of Technology

is now Accredited by



for the Second Time
in Two Undergraduate Programs

Computer Science & Engineering Information Technology



What is it?

NBA accreditation is a quality assurance process that evaluates and certifies educational programs, ensuring they meet high standards. It enhances program credibility, student employability, and aligns with global education benchmarks. Accredited programs are recognized nationally and internationally, benefiting both students and institutions.

Lord Ganesha's Grace

वक्रतुण्ड महाकाय , सूर्यकोटि समप्रभ ।
निर्विघ्नं कुरु मे देव , सर्वकार्येषु सर्वदा ॥

The BBD Campus proudly houses a beautiful Ganesh temple, a spiritual haven that infuses the college with a profound sense of serenity and purpose. The temple's presence on campus is more than just a place of worship; it symbolizes a bridge between the academic and the divine, offering students a space to connect with their spirituality amid their educational journey.

Ganesh Ji, the revered remover of obstacles and the harbinger of wisdom and prosperity, holds a special place in Hindu tradition. His temple at BBD Campus stands as a testament to these values, providing students with a sanctuary where they can seek blessings, reflect, and find solace during their studies. The essence of the temple extends beyond its physical structure, permeating the entire campus with a spirit of peace and positivity.

For many students, college life is a time of immense growth, but it also comes with its share of challenges and uncertainties. The Ganesh temple offers a reassuring presence, reminding students that they are not alone in their journey. It encourages them to pause, pray, and draw strength from their faith, fostering a holistic approach to education that nurtures both the mind and the soul. The act of worshiping together also fosters a sense of community, as students from diverse backgrounds come together in shared reverence, strengthening their bonds and promoting a culture of mutual respect and support.

The choice of a Ganesh temple specifically holds deep significance. Lord Ganesh, revered as the deity of beginnings, is invoked at the start of new ventures to ensure success and remove obstacles. For students embarking on their academic journey, seeking Ganesh's blessings can be a source of immense comfort and confidence. His wisdom and benevolence inspire students to pursue their goals with determination and integrity, knowing they have divine support.

Moreover, the Ganesh Ji temple at BBD Campus serves as a reminder of the cultural and spiritual heritage that underpins our education system. It encourages students to value and preserve these traditions, recognizing that true education encompasses not just intellectual growth, but also moral and spiritual development.

Dr. Akhilesh Das Gupta Ji



LATE DR. AKHILESH DAS GUPTA
MBA, LLB, Ph.D.
Ex-Member of Parliament (Rajya Sabha)
Hon'ble Founder Chairman, BBD Group

"We not only make technocrats at BBD, we churn out citizens of the world, perfect in all respects, be it leadership, competence, confidence, communication, moral or knowledge..." - Akhilesh Das Gupta's Vision.

A distinguished political leader, philanthropist, educationist and social worker, Dr. Akhilesh Das is the pride of Lucknow city. He has established himself as a worthy son of his illustrious father Late Babu Banarasi Das Ji.

He has obtained MBA, LLB & Ph.D.(Human Resource Management)degrees, Dr. Akhilesh Das decided to follow his father's footprints by choosing Social Service as his primary goal. In his distinguished public life spanning well over three decades, Dr. Das was first elected as the Mayor of Lucknow in year 1993 and became one of the youngest Mayors of the world. Subsequently, he was elected as a Member of Parliament (Rajya Sabha) in November 1996 and was re-elected for a second term in November 2002 till November 2008. Dr. Das has been elected again as a Member of Parliament (Rajya Sabha) for a third consecutive term in 2008 till 2014.

Dr. Das has been a member of many important parliamentary committees and National level apex advisory & statutory bodies including the AIMS. He has been a member of the Executive Committee of AICTE. He had been the Chairman Parliamentary Standing Committee for Industries. He also served with distinction as the Union Minister of State for Steel and made a place for himself as one of the foremost National leaders.

Contribution To Sports

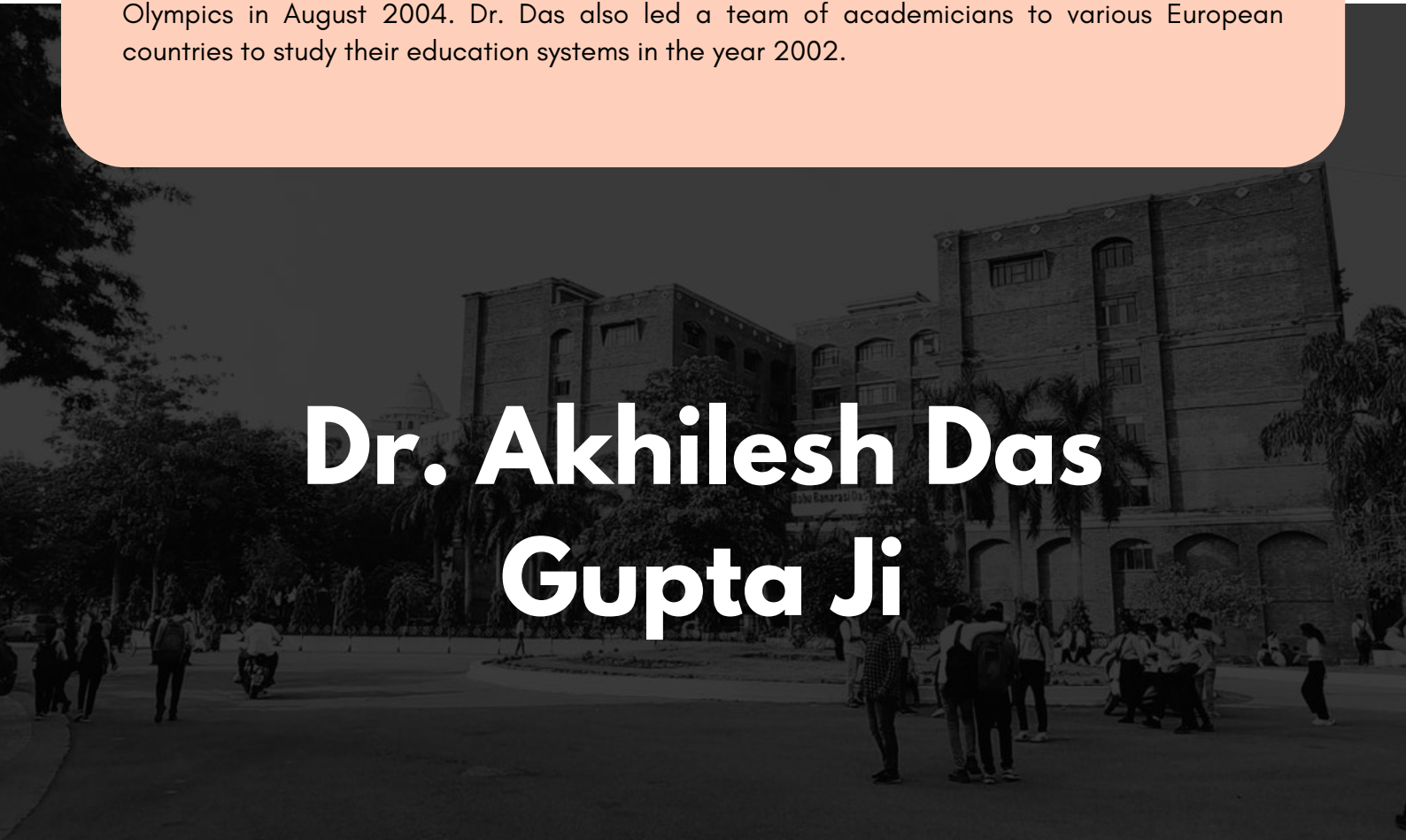
Dr. Akhilesh Das is an enthusiastic sports person. He underwent an exhaustive training in England as a Junior Badminton player. Later, he represented and captained the U.P. State Badminton team for many years and won many National & International tournaments including the National Doubles Championship. His love for other sports is no less. He has been instrumental in organizing and facilitating many National level tournaments in various sports. Presently he is the president of the U.P. Olympic Association & Chairman of Badminton Association of India.

Contribution To The Cause Of Education

As a social thinker, Dr. Das realized the need of Quality Technical & Professional education for the overall growth and upliftment of the masses and development of the State of Uttar Pradesh. Accordingly, Babu Banarasi Das Educational Society (BBDES) was founded through which the torch for higher professional education was lit in Lucknow, the Capital of U.P. The first institution in the series, Babu Banarasi Das National Institute of Technology & Management (BBDNITM) was established in 1998.

Travels And Experiences

He has travelled extensively to U.K., U.S.A., Japan, France, Switzerland, Spain, Portugal, Sau Paulo etc. on several occasions. Dr. Das has attended several World Seminars and Conferences including UNO sponsored Conference of Mayors (Japan) in 1993 and UNCTAD XI Conference (Brazil) in 2004. As the Mayor of Lucknow, he attended the International Children's Game held in Canada in 1994 and led the Indian Badminton Team as its Chef-de-Mission at the Athens Olympics in August 2004. Dr. Das also led a team of academicians to various European countries to study their education systems in the year 2002.



Dr. Akhilesh Das Gupta Ji

Mrs. Alka Das Gupta Ji



MRS. ALKA DAS
M.B.A., L.L.B.
Chairperson, BBD Group

A lady with spirit, determination and zeal, Mrs. Alka Das has been the driving force behind her husband Dr. Akhilesh Das. She is the daughter of Late Justice D. P. Gupta, who held high positions in the State of Rajasthan, as its Governor and Chief Justice. She was brought up on Gandhian ideals and philanthropic traditions.

Mrs. Das is a Management expert and a legal luminary who has a long involvement with issues of social justice and women empowerment in our country. She is a legal consultant to several reputed organizations and an active Social Worker. She is connected with many National Social & Educational Organizations. She is also a Life Member of the "Rajasthan High Court Bar Association". The establishment of Northern India Engineering College, Lucknow was an initiative taken by her to provide quality professional education to match the International Standards.

She has travelled extensively to countries like Denmark, Italy, Japan, France, Switzerland, UK and USA to study the pattern of education and facilities provided to the students there. As a Co-founder of Babu Banarasi Das Group of Educational Institutions, Mrs. Das has made a fertile attempt to nurture a generation of self-made and highly motivated students with an inbuilt commitment to do something constructive for the Country

Mr. Viraj Sagar Das Ji



Mr. Viraj Sagar Das
B.A LL.B (Hons.),
Advocate
President, BBD Group

"Education is the most powerful weapon which you can use to change the world"
– Nelson Mandela

Babu Banarasi Das University has its roots lying deep in quality education practices that equip each student with broad outlooks to prepare them for this futuristic world. We are committed to providing the education that fulfils the needs of today's world. Today, education is not limited to textbook courses and their practical implementation. Education has been through a major transformation where apart from the syllabus, it has become imperative to inculcate some extra skills in the students so that they could truly succeed in their lives. We encourage our students to perform well in their academics and also to take active participation in all the co-curricular activities to develop interpersonal skills, take up challenges, be self-dependent and most importantly, have a good time while learning.

To quote Dr. A.P.J. Abdul Kalam, "Learning gives creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes you great".

Director's Message



Prof. (Dr.) V. K. Singh
Director (Engg.), BBDNIIT, Lucknow

Dear Readers,

"One child, one teacher, one book, one pen can change the world." – Malala Yousafzai

It gives me immense pleasure to introduce our Computer Science and Engineering Departmental college magazine at Babu Banarasi Das Northern India Institute of Technology (BBDNIIT), Lucknow. Since its inception, BBDNIIT has been committed to providing quality technical education and developing competent technocrats who are socially sensitive and committed to excellence on a global scale.

For over 17 years, BBDNIIT has stood as a beacon of academic excellence and innovation in the field of engineering. Our esteemed faculty, state-of-the-art infrastructure, and rigorous academic processes are all geared towards nurturing talent and fostering an environment of growth and learning.

In this magazine, you will find a vibrant showcase of the creativity, dedication, and hard work of our students and faculty. It reflects the dynamic and inclusive community we have cultivated, where every student is encouraged to pursue their passions and excel both academically and personally. Our systematic teaching-learning process prepares students for the challenges ahead, equipping them with the knowledge, skills, and ethical values necessary to make significant contributions to society.

The global technology landscape is evolving rapidly, and to remain competitive, our students must be prepared to face new challenges head-on. BBDNIIT is dedicated to training students to meet these challenges with confidence and competence. We continue to strive for excellence in professional education, aiming for new heights and fostering a thinking, professional order.

I encourage all students to make the most of their time with our dedicated faculty and staff, to develop their proficiency, and to grow both personally and professionally. The doors of our faculty members are always open for guidance and support.

With best wishes for your continued success and growth.

HOD's Message



Prof.(Dr.) Anurag Shrivastava
Head of department

Dear Readers,

"The roots of education are bitter, but the fruit is sweet." —Aristotle

It is a matter of pleasure to speak with all of you through this magazine. We all can take pride from the fact that each one of us has contributed to the present day glory and growth of our college.

I am happy to note that various initiatives are taken by the faculty to disseminate knowledge by organizing conferences, training programs and workshops. Expert lectures are also organized by various departments from time to time to keep abreast with the latest developments in the field of science and technology.

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With best wishes for your continued success and growth.



Institute Vision

To establish a multi-disciplinary environment with excellence in technical education and research for developing competent professionals who meet the challenges of industrial and societal development with human values and ethics.



Institute Mission

- To provide an excellent environment with supporting infrastructure to prepare globally competent professionals acceptable to industry and society.
- To inculcate a spirit of research, innovation and entrepreneurship by exposing multi-disciplinary approach.
- To motivate aspiring graduates to solve real life problems with zeal of lifelong learning.
- To imbibe a healthy environment which helps to develop intellectual capabilities among graduates to transform them into professionals with human values and ethics.



Department's Vision

To provide a conducive environment for learning and create research opportunities in the field of Computer Science and Engineering to meet global requirements using the latest technologies with ethical values.



Department's Mission

- To provide theoretical and practical concepts across the Computer Science discipline.
- To impart an education that is well suited to meet the challenging software needs of the industry.
- To nurture the undergraduate students with multi-disciplinary and research activities to grow as professionals.
- To empower students with moral and ethical values.

PROGRAMME EDUCATIONAL OBJECTIVES

Program Educational Objectives (PEOs)

- To Encourage students to strengthen their technical capabilities for providing solutions to meet industrial and societal needs.
- To groom graduates as professional engineers to work with leadership and problem solving skills.

Program Outcomes (POs)

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.
- PO2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Program Outcomes (POs) continued

- PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling too complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- PO10: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

A person is captured in the middle of a golf swing on a lush green field. The scene is set during sunset or sunrise, with a warm, orange glow in the sky and silhouettes of trees in the background. The person is wearing a blue cap and dark clothing. A white text box with rounded corners is overlaid on the image, containing the title and a list of outcomes.

Program Specific Outcomes (PSOs)

- Ability to design and develop solutions for societal problems by using emerging technologies and standardized emerging principles.
- Develop an understanding for conceptual and practical aspects of programming languages with databases and develop solutions using suitable data structures and algorithmic techniques

Departmental Events & Seminars

International Yoga Day



- BBD University celebrated 2025 International Yoga Day with the theme "Yoga for One Earth, One Health" on 21 June 2025.
- Students and faculty gathered at Dr. Akhilesh Das Gupta Stadium for a collective session of mindfulness and physical wellness

Data Analytics Using Python Workshop



- Held in association with the IEI Student's Chapter of Information Technology to enhance students' analytical capabilities
- The program provided students with hands-on exposure to data processing tools and modern industry-relevant technologies.

Internal Hackathon for SIH 2025



- BBDNIIT conducted an internal hackathon to select top talent for the Smart India Hackathon (SIH) 2025
- The event encouraged students to develop creative solutions for real-world problems under the MoE's Innovation Cell initiative.

Profile Building for Placement & Higher Education



- Krati Yadav, Co-founder of AOO SEEKHE and International Author, shared expert strategies for high-value career growth
- The session on September 29, 2025, focused on optimizing profiles for Fortune 500 recruitment and global higher education.

INDUCTION & ORIENTATION 2025

- It was successfully organized by the Value Education Cell in collaboration with Dyutiman – The Literary Society of BBDNIIT, which includes active participation from many students of the CSE Department.
- The event aimed to welcome the new batch of students and introduce them to the academic culture, values, and opportunities available at the institute.
- An inspiring address by the esteemed Director motivated the students to pursue excellence in academics, innovation, and personal development.
- Various interactive activities, introductions to student clubs, and committee presentations were conducted to help newcomers understand the vibrant campus ecosystem.
- Overall, the induction programme served as a platform to build connections, inspire confidence, and familiarize students with the diverse opportunities within the college community.

INSPIRUS 4.0 - ANNUAL LITERARY FESTIVAL

- It was successfully organized by Dyutiman – The Literary Society of BBDNIIT, celebrating creativity, expression, and the spirit of literature among students.
- The festival was conducted under the leadership of Shivang Agrawal, a 4th year B.Tech CSE student and the current Coordinator of Dyutiman, whose dedication and vision played a key role in the successful execution of the event.
- The festival featured engaging events such as debates, creative writing, poetry recitation, storytelling, and extempore speaking, encouraging students to showcase their ideas and talents.
- INSPIRUS 4.0 served as a platform for young minds to express their thoughts, develop communication skills, and celebrate the power of words and ideas.
- The festival once again highlighted the commitment of Dyutiman towards promoting literary excellence and intellectual engagement within the campus.



AI and Quantum Computing: Cyber security Risk or Protection?

We are living in a time of remarkable technological advancement thanks to the development of artificial intelligence (AI) and quantum computing. These fields have the potential to improve our lives and revolutionize industries. Their possible influence on cyber security, however, is nuanced.

Quantum Computing: A Two-Sided Sword

Current encryption standards could be broken by quantum computers because of their enormously quicker calculation speed compared to conventional computers. The possibility of compromising sensitive data makes this a serious threat to the digital world. But the same technology can also be used to develop unbreakable encryption techniques that protect data from even the most advanced cyber attacks.

It's a race to create encryption algorithms that can withstand quantum attacks. The result of this battle will determine how secure data will be going forward, as researchers and cyber-security specialists strive nonstop to keep ahead of possible dangers.

AI can quickly analyze enormous volumes of data, which enables it to spot irregularities, recognize risks, and react to attacks instantly. AI-powered solutions can identify and stop cyber attacks, protecting private data and vital infrastructure.

On the other hand, Artificial intelligence-generated synthetic media, or "deep fakes," can be used to propagate false information and sway public opinion. AI can also automate cyber attacks, which makes them more complex and difficult to identify.

The Balancing Act: An Essential Method

This is a complicated terrain, and you need to approach everything with balance. To be safe from future cyber attacks, quantum-resistant cryptography must be highlighted.

In addition, in order to overcome the obstacles presented by quantum and artificial intelligence, it is imperative that academics, business, and government collaborate. We can create resilient cyber security plans that will stand the test of time by pooling our knowledge and resources.

In conclusion, there are a number of benefits and drawbacks for cyber security related to artificial intelligence and quantum computing.

We can leverage the power of these technologies to create a safer digital future by being aware of these dualities and taking preventative action.

AI: A Digital Defensive Mechanism against Cyber attacks

Artificial intelligence (AI) is rapidly transforming the cyber security landscape. Its exceptional speed at which it can digest large volumes of data makes it an effective tool for identifying and averting cyber attacks.

- **Threat Detection:** Artificial intelligence (AI) systems can scan human behavior, network traffic, and system logs for patterns that can indicate malicious activity. Because AI systems learn from past attacks, they may be able to recognize even the most sophisticated threats that traditional security measures might miss.
- **Anomaly Detection:** AI is highly skilled at spotting odd trends in data. This feature enables it to identify irregularities, such as strange login attempts that can indicate a possible attack.
- **Real-time Threat Response:** AI-driven systems can initiate incident response procedures, isolate compromised systems, and block malicious traffic in real time in reaction to an attack. Consequently, the effect of cyber attacks is significantly reduced.
- **Predictive Analytics:** AI can forecast possible risks and weaknesses by examining past data. This enhances an organization's overall security posture by enabling them to proactively employ countermeasures.
- **Automation:** Artificial intelligence (AI) automates routine cyber security tasks like vulnerability detection and patch administration, freeing up human experts to work on more challenging issues.

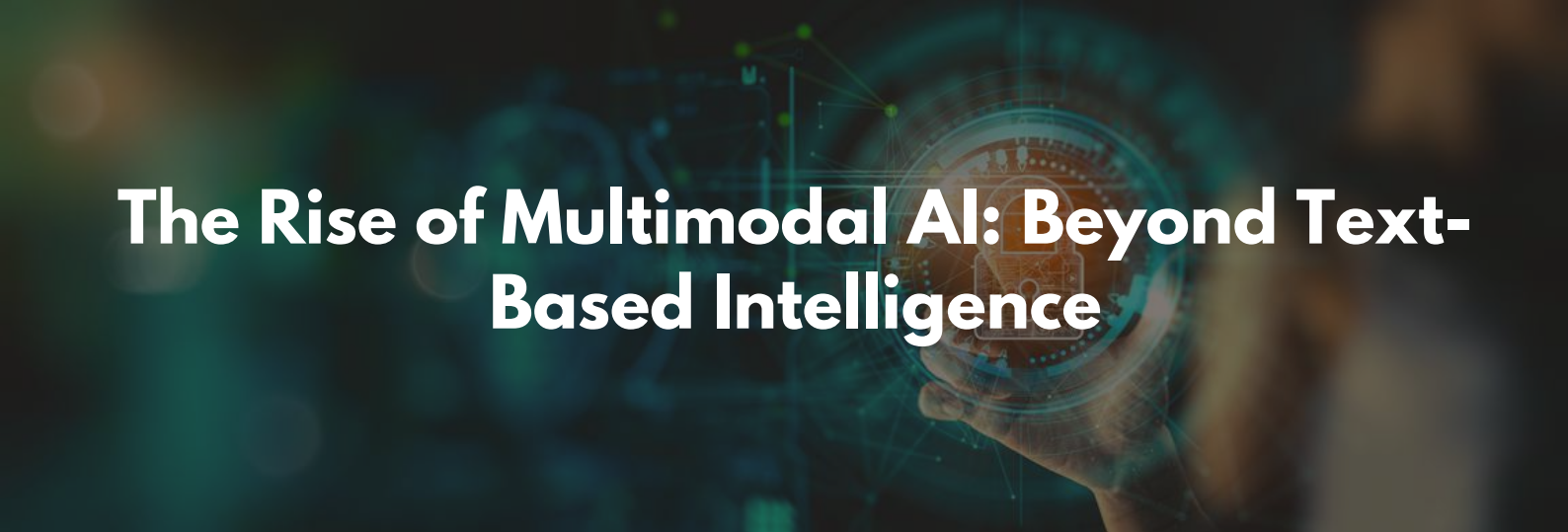
Obstacles and Things to Think About

Even though AI has a lot of potential for cyber security, there are several issues that need to be resolved. Large data sets are needed for AI systems to learn and develop, which raises privacy issues. Adversarial attacks are another possibility, in which malevolent actors alter AI systems in order to avoid discovery.

Organizations need to make significant investments in trained staff, strong data management procedures, and continuous research and development if they hope to fully reap the benefits of AI in cyber security.

To sum up, artificial intelligence is revolutionizing the battle against cybercrime. We can create a safer digital environment by wisely using its power. To keep ahead of ever-evolving dangers, it is imperative that aspiring cyber security professionals comprehend the complexities of artificial intelligence and its applications.

*Author: Dr. Anurag Shrivastava
Professor and Head
Department of Computer Science & Engineering*



The Rise of Multimodal AI: Beyond Text-Based Intelligence

Artificial Intelligence is no longer limited to understanding and generating text. The latest wave of innovation is driven by multimodal AI—systems capable of processing and integrating multiple forms of data such as text, images, audio, and video. This shift marks a major evolution in how machines perceive and interact with the world, bringing AI closer to human-like understanding.

What is Multimodal AI?

Multimodal AI refers to systems that can analyze and combine different types of inputs simultaneously. Unlike traditional AI models that specialize in a single data type (like text-only chatbots or image classifiers), multimodal systems can:

- Understand a question asked in text while analyzing an accompanying image
- Generate descriptions for videos
- Interpret voice tone along with spoken words
- Combine visual and textual context for better decision-making

In simple terms, it's AI that doesn't just "read" or "see"—it understands context across multiple senses.

Why Multimodal AI is Rising Now

Several technological advancements have accelerated the growth of multimodal AI:

1. Improved Deep Learning Architectures

Transformers and large-scale neural networks can now process diverse data types in unified frameworks.

2. Massive Data Availability

The internet provides vast amounts of multimodal data—videos, images, audio, and text—fueling training at scale.

3. Powerful Computing Resources

Modern GPUs and cloud infrastructure allow training of highly complex models.

4. Real-World Demand

Industries require AI systems that can interact naturally with humans, not just through text but through voice, visuals, and behavior.

Key Applications of Multimodal AI

1. Healthcare

Multimodal AI can analyze medical images (like X-rays) alongside patient history and doctor notes to improve diagnosis accuracy.

2. Autonomous Systems

Self-driving cars rely on multiple data streams—camera feeds, sensor data, GPS, and real-time environment analysis.

3. Customer Experience & Support

AI assistants can understand tone of voice, facial expressions, and text queries to provide more personalized responses.

4. Content Creation

AI tools can generate images from text prompts, create videos, or even combine voice and visuals for storytelling.

5. Fraud Detection & Security

Systems can analyze voice patterns, behavioral data, and transaction records to detect suspicious activity more effectively.

Advantages Over Traditional AI

- Better Context Understanding: Combines multiple signals → more accurate decisions
- Human-like Interaction: Communicates through voice, visuals, and text
- Higher Accuracy: Reduces errors caused by relying on a single data source
- Versatility: Applicable across industries and use cases

Challenges and Limitations

Despite its potential, multimodal AI faces several challenges:

- Data Complexity: Handling and aligning different data types is difficult
- High Computational Cost: Requires significant processing power
- Bias and Ethical Concerns: Multiple data sources can amplify bias
- Integration Issues: Combining models and pipelines is technically complex

The Future of Multimodal AI

The future of AI lies in fully integrated intelligent systems that can see, hear, speak, and reason simultaneously. We are moving toward:

- AI assistants that understand emotion, context, and intent
- Smart devices that operate independently in real-world environments
- Seamless human-AI interaction across multiple sensory channels

Multimodal AI is expected to power the next generation of innovations in education, healthcare, entertainment, and automation.

Mohd Ayan

2nd Year

2300560100134

Computer Science & Engineering

Smart Cities Powered by IoT and AI

Cities are expanding faster than ever, bringing challenges like traffic congestion, pollution, energy demand, and public safety. To tackle these issues, governments and urban planners are turning toward smart cities—urban environments enhanced by Internet of Things (IoT) and Artificial Intelligence (AI). Together, these technologies are transforming cities into intelligent ecosystems that can sense, analyze, and respond in real time.

What is a Smart City?

A smart city uses connected devices (IoT) and intelligent systems (AI) to collect and analyze data, improving urban services and quality of life. From traffic lights that adapt to congestion to energy grids that optimize consumption, smart cities aim to make urban living more efficient, sustainable, and responsive.

Role of IoT in Smart Cities

IoT forms the foundation of smart cities by enabling data collection through sensors and devices.

Examples of IoT in cities:

- Smart Traffic Sensors: Monitor vehicle flow and reduce congestion
- Environmental Sensors: Track air quality, noise levels, and temperature
- Smart Meters: Measure electricity and water usage in real time
- Waste Management Systems: Detect when bins are full and optimize collection routes

These devices continuously generate data, creating a digital layer over physical infrastructure.

Role of AI in Smart Cities

While IoT collects data, AI acts as the brain that analyzes and makes decisions.

Key AI functions:

- Predictive Analytics: Forecast traffic patterns, energy demand, or crime hotspots
- Automation: Adjust traffic signals, lighting, and resource distribution automatically
- Pattern Recognition: Identify anomalies such as accidents or system failures
- Decision Support: Assist city authorities in planning and policy-making

AI transforms raw data into actionable insights.

Key Applications of Smart Cities

1. Smart Transportation

AI-powered traffic systems analyze real-time data to reduce congestion and optimize routes. Public transport can be scheduled dynamically based on demand.

2. Energy Management

Smart grids use AI to balance electricity supply and demand, reducing waste and promoting renewable energy usage.

3. Public Safety

Surveillance systems combined with AI can detect unusual activities, improving response time for emergencies.

4. Healthcare

Remote monitoring systems track patient health using IoT devices, enabling faster medical intervention.

5. Waste & Water Management

IoT sensors monitor waste levels and water usage, ensuring efficient resource allocation.

Benefits of Smart Cities

- Improved Efficiency: Automated systems reduce delays and resource waste
- Sustainability: Better energy and resource management lowers environmental impact
- Enhanced Quality of Life: Faster services, safer environments, and cleaner cities
- Data-Driven Governance: Decisions based on real-time insights

Challenges and Concerns

Despite the advantages, smart cities face several challenges:

- Data Privacy & Security: Massive data collection raises concerns about misuse
- High Implementation Cost: Infrastructure development requires heavy investment
- Technology Integration: Combining multiple systems can be complex
- Digital Divide: Not all citizens may benefit equally from advanced technologies

Future of Smart Cities

The future of smart cities lies in deeper integration of AI and IoT with emerging technologies:

- 5G Networks for faster communication between devices
- Edge Computing for real-time data processing
- Digital Twins to simulate and optimize city planning
- Autonomous Systems like self-driving public transport

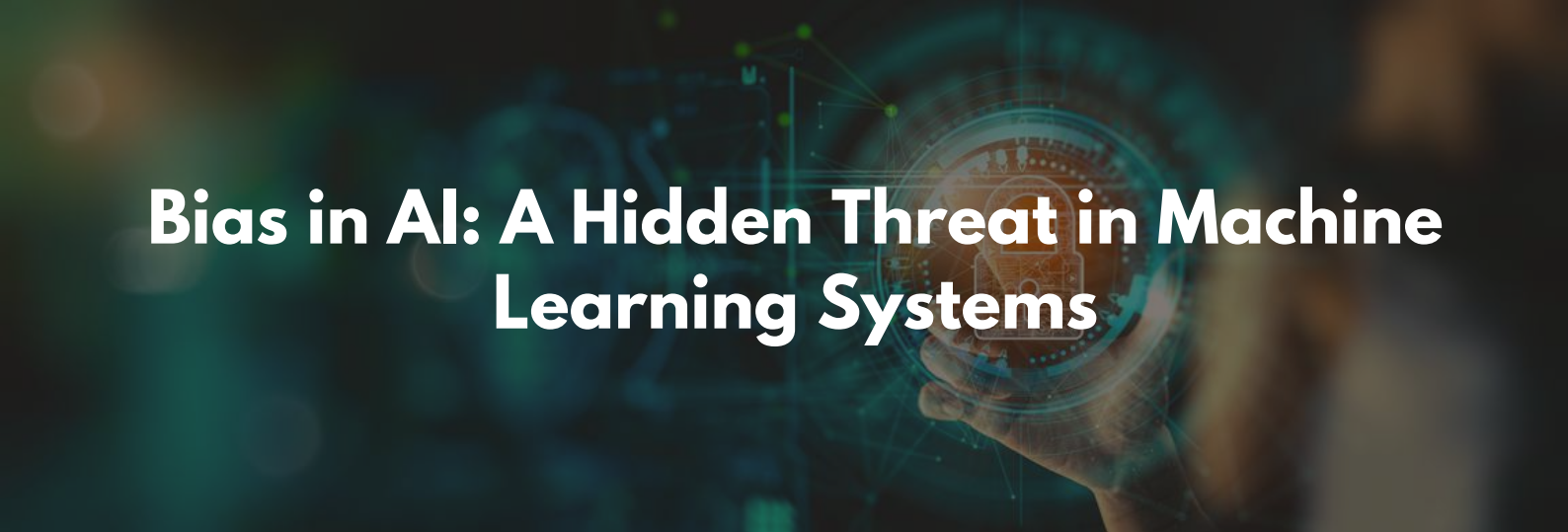
Cities will evolve into self-regulating environments capable of adapting dynamically to changing conditions.

Sahil Khan

2nd Year

2300560100183

Computer Science & Engineering



Bias in AI: A Hidden Threat in Machine Learning Systems

Artificial Intelligence (AI) is increasingly shaping decisions in hiring, healthcare, finance, policing, and beyond. While these systems promise efficiency and objectivity, they often inherit and amplify biases present in the data and design choices behind them. The result is a hidden but powerful threat: machine learning systems that can systematically disadvantage certain groups while appearing neutral.

What is Bias in AI?

Bias in AI refers to systematic and unfair favoritism or discrimination produced by an algorithm. It can manifest when models produce outcomes that consistently benefit one group over another based on attributes like race, gender, age, language, or socioeconomic status.

Crucially, bias is not always intentional. It often emerges from:

- Historical data that reflects past inequalities
- Imbalanced datasets that underrepresent certain groups
- Design decisions that embed subjective assumptions

How Bias Enters Machine Learning Systems

1. Biased Data

Models learn patterns from data. If the data is skewed, the model will reflect that skew.

- Example: A hiring model trained on past resumes may prefer candidates similar to previous hires.

2. Sampling Bias

If certain populations are underrepresented, the model performs poorly for them.

- Example: Facial recognition systems struggling with darker skin tones.

3. Labeling Bias

Human annotators bring their own assumptions into labeling data.

- Example: Sentiment labels influenced by cultural context.

4. Algorithmic Bias

Even with good data, model design choices can introduce bias.

- Example: Optimization for overall accuracy may ignore minority groups.

Real-World Impact of AI Bias

1. Hiring and Recruitment

AI screening tools may favor specific demographics based on historical hiring trends.

2. Healthcare

Biased datasets can lead to misdiagnosis or unequal treatment recommendations.

3. Financial Systems

Credit scoring algorithms may disadvantage individuals from certain backgrounds.

4. Law Enforcement

Predictive policing tools may disproportionately target certain communities.

Why AI Bias is Dangerous

- Invisible: Bias often goes unnoticed because AI decisions appear “objective”
- Scalable: A biased model can affect millions of users simultaneously
- Reinforcing Inequality: It can perpetuate and amplify existing social disparities
- Loss of Trust: Users may lose confidence in AI-driven systems

Mitigating Bias in AI

Addressing bias requires a multi-level approach:

1. Better Data Practices

- Use diverse and representative datasets
- Regularly audit and clean data

2. Fairness-Aware Algorithms

- Incorporate fairness constraints during training
- Evaluate models across different demographic groups

3. Transparency & Explainability

- Develop models that can explain their decisions
- Enable auditing and accountability

4. Human Oversight

- Keep humans in the loop for critical decisions
- Establish ethical review processes

Challenges in Eliminating Bias

- Defining Fairness: Different contexts require different fairness definitions
- Trade-offs: Improving fairness may reduce overall accuracy
- Data Limitations: Truly unbiased data is difficult to obtain
- Complex Systems: Modern AI models are often hard to interpret

The Future: Toward Ethical AI

The future of AI depends not only on innovation but also on responsibility. Organizations are now focusing on:

- Ethical AI frameworks
- Regulatory compliance
- Bias auditing tools
- Inclusive AI design practices

As AI continues to integrate into everyday life, ensuring fairness is not optional—it is essential.

Kshitiz Sengar

2nd Year

2300560100120

Computer Science & Engineering

HALL OF FAME

LITERARY GURU 2025



- **Sahil Khan** (2nd year) 2300560100134 CSE student, has been awarded the prestigious **Literary Guru 2025** for his exceptional contribution to the literary culture of the institution.
- Known for his depth of thought, eloquence, and leadership within literary activities, he has played a vital role in guiding and inspiring fellow students.
- His dedication to literature and mentorship has significantly strengthened the creative and intellectual environment of the society.

"The future belongs to those who turn knowledge into innovation and effort into excellence."

OUR TOPPERS

Our Final Years (4th Year)

AISHITA SAXENA

3rd Year

SANJANA KESHARI

2nd Year

NAZIA KHATOON

"Strive not to be a success, but rather to be of value."



NPTEL EXCELLENCE

The **National Programme on Technology Enhanced Learning (NPTEL)** is a prestigious initiative by the IITs and IISc. Achieving "Elite" status and "Topper" recognition signifies a student's mastery over complex subjects on a national scale.

SHIVANG AGRAWAL (4th Year)



- **Course Mastery:** Completed an 8-week specialization in **"Enhancing Soft Skills and Personality"** through IIT Kanpur.
- **National Ranking:** Recognized as a **Top 5%** Topper nationwide among 12,566 certified candidates.
- **Scorecard:** Earned an Elite certification with a high consolidated score of **86%**



- **Course Mastery:** Completed an 12-week specialization in **"Introduction To Industry 4.0 & Industrial IOT"** through IIT Kharagpur.
- **National Ranking:** Recognized as a **Top 5%** Topper nationwide among 12,566 certified candidates.
- **Scorecard:** Earned an Elite certification with a high consolidated score of **87%**

SANJANA KESHARI (4th Year)



- **Course Mastery:** Successfully completed a 12-week intensive course on **"Cloud Computing"** through IIT Kharagpur.
- **National Ranking:** Secured a place in the **Top 5%** of the 27,874 candidates who appeared for the exam.
- **Scorecard:** Achieved an **Elite** gold-standard consolidated score of **75%**

SAFARSETU

An AI-Powered Multilingual Tourist Guide Chatbot for Cultural Heritage Exploration

Research Paper

Authors: Anurag Shrivastava, Shivang Agrawal, Sanjana Keshari, Krishna Vishwakarma, Mohd. Taukeer

Publishing Journal: International Journal for Research in Applied Science & Engineering Technology (IJRASET)

DOI: <https://doi.org/10.22214/ijraset.2025.76656>

Keywords: Cultural Heritage, Natural Language Processing, Asynchronous Computing, Neural Text-to-Speech, Serverless Architecture, Heritage Tourism, Telegram API.

Abstract: India's architectural heritage, particularly the vernacular Havelis (traditional mansions), faces a critical dual challenge: physical deterioration and a fading public narrative. While the "Digital India" initiative has accelerated technology adoption, existing heritage tourism solutions often rely on high-bandwidth mobile applications or English-centric interfaces, creating a "digital divide" that excludes a vast demographic of domestic rural tourists. This paper proposes SAFARSETU, a serverless, zero-install, multilingual chatbot built on the Telegram platform designed to democratize access to heritage information. Unlike traditional synchronous bots, our architecture employs a novel Asynchronous NLP Pipeline utilizing Python's asyncio library to parallelize Neural Machine Translation (NMT) via Google Translator and Neural Text-to-Speech (TTS) via Edge-TTS. We introduce a custom "Sentence-Aware Chunking Algorithm" to overcome Telegram's 4096-character message limit without disrupting semantic continuity or audio prosody. Experimental validation across 500+ interaction cycles demonstrates that the system maintains a Total Response Time (TRT) of <1.8 seconds for complex multilingual queries, significantly outperforming synchronous architectures. SAFARSETU offers a scalable, inclusive reference architecture for digital heritage tourism in resource-constrained environments.

PERSONALIZATION AND RECOMMENDATION SYSTEMS IN E-COMMERCE PLATFORM

Research Paper

Authors: Shashank Kumar Chaudhary, Saurabh Vishwakarma, Utkarsh Srivastava, Suryansh Maurya, Shashank Tiwari

Publishing Journal: International Research Journal of Modernization in Engineering Technology and Science (IRJMETS)

DOI: <https://www.doi.org/10.56726/IRJMETS87907>

Keywords: HTML, CSS, Javascript, React, Python, Node, Java, Express, MongoDB, MERN Stack, Processing Algorithms Etc.

Abstract: We are presenting this project which includes the development of a modern E-commerce Platform using Express.js, React.js, MongoDB, MERN stack and Node.js. The objective of this system or website is to fulfill the user or customer's requirements and provide a secure and user-friendly online shopping platform. It allows users to add items to the cart, secure checkout processes, secure login, register and apply search filters etc. It ensures the protection of user information, data handling and secure authentication.

The architecture of MERN supports fast performance, real-time data updates and smooth and better connection and communication between frontend and backend. Designs ensure similarity across mobiles, tablets, desktop devices etc. In this type of system, operational efficiency has been improved. Comprehensively, the system provides reliable and efficient online.

Due to technology and its rapid development, our business is becoming more and more changed and in the same business, E-commerce has been given birth, which is an e-commerce platform where our users are, they use it to buy goods and an e-commerce platform provides all the facilities, it saves our time and efforts and for the secure implementation of this platform, these algorithms are used which help in making this website run smoothly.

ECHO ALUMNI

A CLOUD-NATIVE MICROSERVICES ARCHITECTURE FOR ENHANCED INSTITUTIONAL ENGAGEMENT

Research Paper

Authors: Karan Singh Yadav, Manasvi Singh, Mohammad Iqbal, Nikhilesh Kumar Gupta, Nitish Kumar Gupta, Preeti Singh

Publishing Journal: International Research Journal of Modernization in Engineering Technology and Science (IRJMETS)

DOI: <https://www.doi.org/10.56726/IRJMETS88555>

Keywords: Cloud-Native, Microservices, Next.js, Alumni Engagement, Kubernetes (EKS), AWS RDS.

Abstract: Educational institutions worldwide face challenges in maintaining structured relationships with their alumni networks. Current communication methods often rely on fragmented, unofficial channels like WhatsApp or LinkedIn, which offer limited data reliability and poor institutional oversight. This paper presents Echo Alumni, a cloud-native, secure, and scalable alumni engagement ecosystem built on a microservices architecture. The system utilizes modern web technologies including Next.js, Node.js, and AWS EKS to provide verified user access, automated event management, and structured mentorship pathways. This research highlights the transition from legacy manual portals to intelligent, containerized engagement platforms that ensure 24/7 accessibility and real-time analytics for institutional growth.

In the modern digital landscape, alumni networks are vital for institutional reputation, student mentorship, and career placement. However, traditional engagement methods are hindered by fragmented communication channels and a lack of centralized oversight. Echo Alumni is proposed as a centralized, cloud-native solution designed to modernize institutional-alumni relationships. By utilizing a microservices architecture, the platform ensures horizontal scalability and fault tolerance. The system automates user verification, event coordination, and job opportunity sharing, moving away from the limitations of legacy monolithic portals.

PRSNL AI

SAAS BASED WEB APPLICATION

Research Paper

Authors: Aliza Raza Rizvi, Mohd Nawaaz, Danish Raza, Mohd Sartaj

Publishing Journal: International Research Journal of Modernization in Engineering Technology and Science (IRJMETS)

DOI: <https://www.doi.org/10.56726/IRJMETS88748>

Keywords: SaaS, Artificial Intelligence, Gemini API, Web Application, Cloudinary, Clerk, NeonDB.

Abstract: The convergence of cloud computing and artificial intelligence is reshaping the accessibility and utilization of sophisticated digital applications. PRSNL AI represents a Software-as-a-Service solution hosted in the cloud, engineered to consolidate diverse intelligent functionalities into one cohesive framework. This platform facilitates activities like generating articles, crafting blogs, evaluating resumes, producing images, and eliminating backgrounds, thereby providing a streamlined hub for addressing multifaceted digital needs.

Central to its operations is the Gemini API, which powers sophisticated linguistic comprehension and content creation. Authentication and data protection are facilitated by Clerk, while Cloudinary oversees media asset handling, and NeonDB provides serverless storage for information. This investigation delves into the architectural design, implementation strategies, and operational benefits of PRSNL AI. Ultimately, it aims to illustrate the productivity gains achieved via a unified web interface that minimizes reliance on disparate utilities.

The Software-as-a-Service paradigm has emerged as a dominant method for distributing digital tools, owing to its inherent scalability, adaptability, and minimal requirements for on-site hardware. Through this approach, individuals can engage with complex applications via standard web browsers, bypassing the complexities of local setups and routine upkeep.

APPOINTMEDIC

ONLINE DOCTOR APPOINTMENT BOOKING SYSTEM

Research Paper

Authors: Puneet Shukla, Abhishek Madhasia, Gopal Ji Singh, Abhiprit Kumar

Publishing Journal: International Research Journal of Modernization in Engineering Technology and Science (IRJMETS)

DOI: <https://www.doi.org/10.56726/IRJMETS86781>

Keywords: MERN Stack, Healthcare Automation, Razorpay, Cloudinary, Gemini AI, Appointment Booking System.

Abstract: The digital healthcare ecosystem continues to evolve rapidly, yet many patients still face challenges in booking timely medical appointments due to inefficient systems and lack of automation. AppointMedic is a modern full-stack web application built using the MERN (MongoDB, Express.js, React.js, Node.js) framework to simplify the appointment-booking workflow for patients and doctors. The system integrates Cloudinary for secure document management, Razorpay for cashless payments, and Google Gemini for an AI-powered chatbot capable of providing instant guidance, symptom-based suggestions, and appointment assistance. This paper presents the motivation, architecture, implementation methodology, and performance evaluation of AppointMedic. Findings reveal that integrating AI-driven support and automated booking significantly reduces wait time, enhances user experience, and improves accessibility to healthcare services. The healthcare industry has witnessed a major shift toward digitalization, especially after the rise of telemedicine and online consultations. However, many hospitals and clinics still use outdated systems or manual processes for appointment scheduling. This results in long queues, scheduling conflicts, and inefficient communication between patients and healthcare providers. AppointMedic was conceptualized to address these real-world problems. It serves as an intelligent, user-friendly, and secure appointment booking platform. Built using the MERN stack, the platform ensures high scalability, fast performance, and real-time responsiveness.



From the Editors Pen.....

Dear Readers,

It is with immense pride and heartfelt excitement that we present to you the inaugural edition of our departmental magazine, Techvishta! This debut release is a vibrant volume, woven with the threads of innovation, technical excellence, and the dynamic spirit that defines the Department of Computer Science and Engineering at BBDNIIT.

Our dedicated editorial team has poured their heart and soul into every page of this publication. We have meticulously captured the pulse of our department—from the academic brilliance in our classrooms to the cutting-edge advancements in our campus labs. This edition highlights the vibrant energy of our student societies and the relentless passion of our technical teams, who continue to push the boundaries of what is possible.

Techvishta stands as a beacon of the tireless efforts and unwavering commitment of our students and faculty. Within these pages, you will find a record of our collective journey:

- Academic Milestones: Celebrating the research and publications that strengthen our foundation.
- Technical Synergy: Showcasing workshops on Python, Salesforce, and Mobile App Development that bridge the gap between theory and industry.
- Innovation & Spirit: Capturing the drive of our Hackathon winners and the vision of our budding entrepreneurs.

This magazine is more than just a publication; it is a celebration of our dreams and the unyielding spirit of the BBDNIIT family. As you journey through these pages, we invite you to feel the pulse of our department and embrace the shared vision that propels us toward greater heights.

Thank you for being part of this incredible journey. Here's to new beginnings, endless possibilities, and the boundless potential of the CSE department!

With Heartfelt Gratitude,

The Editorial Team

Student : Shivang Agrawal, Batch 2026, Computer Science & Engineering

Guided By: Prof. (Dr.) Anurag Shrivastava (HOD, CSE)

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Faculty Editor*



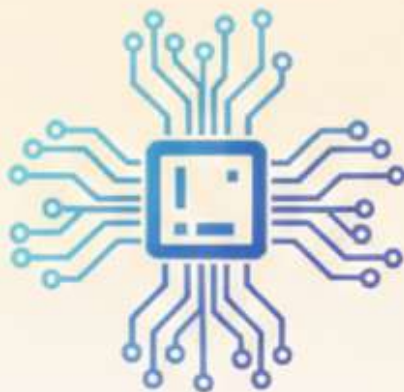
SHIVANG AGRAWAL

CSE - 2026 Batch



BBDNIIT

Babu Banarasi Das Northern India Institute of Technology



"Do the best you can until you know better.
Then when you know better, do better."



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