# NIST Chronicle

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## 5G: CONNECTING DREAMS & POWERING PROGRESS


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## MESSAGE FROM THE PRESIDENT

NIST Chronicle team members' diligence and dedication for publishing the eNews with latest happening at NIST and focusing on key articles relevant to education, technology, time and society if certainly laudable. It is indeed a great pleasure to know that, this particular issue of NIST Chronicle is focused on the featured article: "5G India: Connecting Dreams and Powering Progress" is very timely, as world is aggressively moving forward with deployment of 5G and looking forward to 6G.

5G fundamentally is a paradigm shift compared to earlier mobile technologies such as: 3G, 4G/LTE etc. 5G is based on cloud native architecture and offers multi-gigabit speeds, low latency, high availability/reliability, energy efficiency, high speed mobility etc. compared to the previous-generation mobile networks. There are various models of 5G addressing different spaces like: public 5G, 5G Private Wireless Network (PWN), 5G based Fixed Wireless Access (FWA). 5G is expected to support many use cases in broad domains of smart manufacturing, transportation, healthcare, mining, oil & gas, retail, finance etc. and enabling a hyper connected world.

India launched its first 5G network in October 2022, marking one of the rapidly growing nationwide 5G network deployments in the world. The 5G frequency bands in India are available in low band (700 MHz, 800 MHz, 900 Mhz), mid band (1800 MHz, 2100 MHz, 2500 MHz, 3300 MHz) and high band (26 Ghz).


The deployment of 5G is playing a crucial role in the evolution of making India as one of the leading economies in the world, by enabling the deployment of new technologies, services, and growth of digital economy. 5G technology is expected to deliver advances in creating digital governance, digital business models, and digital solutions. In this transformation journey, 5G certainly would enable evolving technologies like AI, IoT, AR and VR to drive

positive and productive outcome enabling significant progress. With a connected ecosystem of 1.16 billion telecom subscribers and digitally connected enterprises and government, today India boasts of unparalleled use of technology to drive a sustainable and inclusive growth.

We at NIST University (www.nist.edu) have already established the 5G and Future Communication Global Innovation Center (GIC). The GIC infrastructure is provided by Celona (www.celona.io), California, USA. The GIC has completed 5G infrastructure including core, radio (gNodeB), and antennas supporting 5G Private Wireless Networks (PWN).

NIST University campus is currently running 5G PWN leveraging the mid-band spectrum provided by DoT. NIST University is working with Celona collaboratively in applied research, joint research grants, patents, and developing/demonstrating use cases leveraging 5G PWN in order to solve business issues and challenges in different domains.

I congratulate the entire editorial team for their hard work, diligence and dedication for bringing out this wonderful edition of NIST Chronicle.

**Dr. Sukant K. Mohapatra**




## MESSAGE FROM THE VICE CHANCELLOR

As we step into a new era driven by technological advancements, it is thrilling to witness the transformation taking place all across India's digital landscape. The advent of 5G technology marks a pivotal moment in our nation's journey toward becoming a digitally empowered society and a global economic powerhouse.

The cover feature of this issue of NIST Chronicle, "5G India: Connecting Dreams and Powering Progress," could not be more timely. 5G promises to be more than just faster internet; it will be the backbone of the digital economy, enabling innovations in sectors like healthcare, agriculture, emergency response, mining, and manufacturing.

At NIST University, we are keenly aware of our role in preparing the next generation of leaders who will not only harness the potential of these emerging technologies but also push the frontiers of innovation, exemplified by advancements such as 6G communications. Consequently, we have collaborated with such industry leaders as Celona, USA, and the IEEE to bring practice, innovation, and applications research to our campus and beyond.

Our university's mission is to remain at the forefront of technological and educational progress, prepared to bolster India's vision for a Viksit Bharat. We are deeply committed to fostering innovation, interdisciplinary learning, and an ecosystem where students, faculty, and industry can collaborate to solve real-world problems.

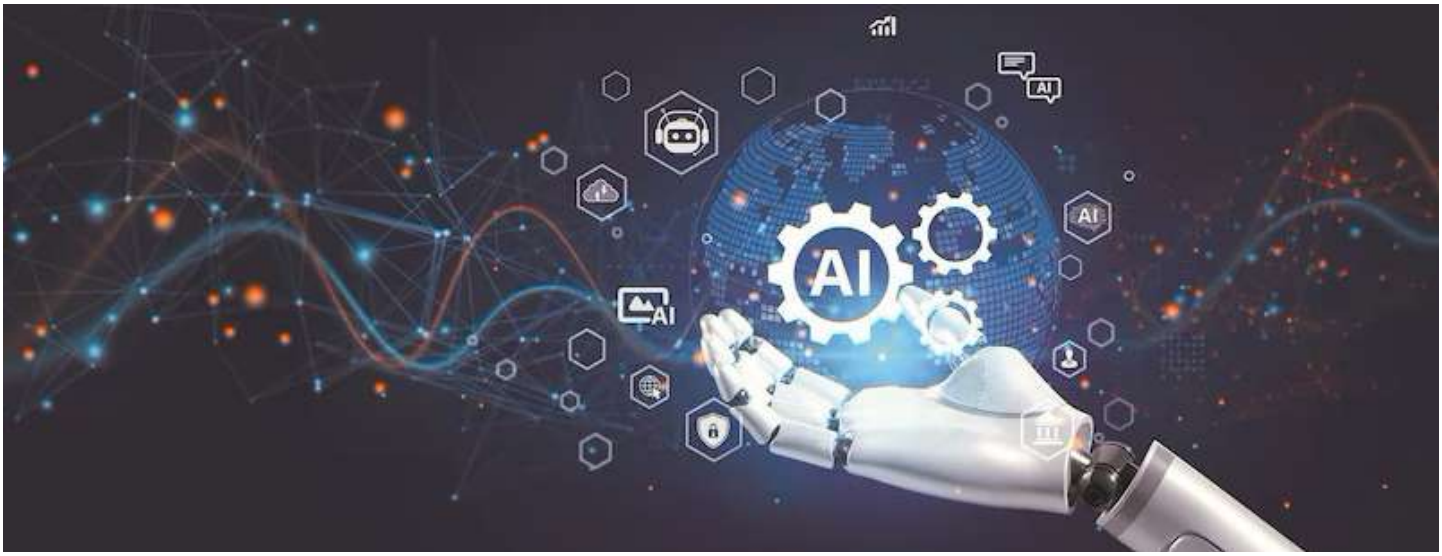
This issue of the Chronicle also continues our efforts to bring you insights from industry captains on emerging technologies and career opportunities, ensuring our students and faculty are well-informed and future-ready. As you explore these perspectives,

I encourage you to think critically about how we, as a university community, can contribute to shaping India's future through human-centric, technology-driven solutions, innovation, and research.

Let us remain united in our mission to transform dreams into reality, powered by learning, successive refinement, and the courage to innovate.

Warm regards,

Prof. Priyadarsan Patra






## MESSAGE FROM THE CHRONICLE ADVISOR

As we step into a new season, it's impossible to ignore the waves of change around us. Whether in business, technology, or our personal lives, transformation is the constant thread that ties us all together. In this issue of NIST Chronicle, we reflect on the challenges and opportunities that change brings.

Change can often feel overwhelming, but it also holds the key to growth and innovation. From embracing new technologies to adopting fresh perspectives, we are witnessing remarkable shifts in how we work, communicate, and connect. The landscape is evolving, and so are we. In this edition, we explore the most pressing trends shaping our industry and how we can leverage them for success.

In the digital age, one technology stands at the forefront of innovation and transformation: 5G. With its promise of faster speeds, more reliable connections, and groundbreaking possibilities, 5G is set to revolutionize how we live, work, and communicate. The speed revolution is about to experience a quantum leap with the advent of 5G Every industry—from healthcare to agriculture—will witness tremendous advancements in the coming years. Beyond personal applications, 5G is set to transform industries. With its low latency and high bandwidth, it empowers technologies like artificial intelligence (AI), augmented reality (AR), and virtual reality (VR). This is a game-changer for sectors such as healthcare, manufacturing, and logistics. The concept of smart cities will also gain significant momentum, enhancing urban infrastructure and efficiency.

We're excited to share stories from within our NIST community, spotlighting individuals who are leading the way in making a difference. These stories remind us that, even amid uncertainty, we have the power to shape the future.

We hope this issue inspires you to embrace change with optimism and curiosity, knowing that every new challenge presents an opportunity to learn, grow, and thrive.Thank you for being part of this journey with us. Let's move forward together.

**Dr. Sabyasachi Rath**

# LETTER FROM EDITORIAL DESK

## 5G: Connecting Dreams and Powering Progress

In literature, the concept of verisimilitude—the appearance of truth—has long shaped storytelling, making the fictional seem real. Much like this literary device, technological advancements strive to blur the lines between imagination and reality. One such breakthrough is 5G communication, a transformative force redefining how we connect, create, and consume information.

As we step into this new era of connectivity, 5G is more than just an upgrade; it is a revolution in speed, efficiency, and real-time interaction. With its ultra-low latency, higher bandwidth, and the ability to connect multiple devices simultaneously, 5G is set to reshape industries—from education and healthcare to transportation and entertainment. It enables real-time telemedicine, enhances remote learning through augmented reality (AR) and artificial intelligence (AI), and fuels the development of smart cities and autonomous systems.

For a university ecosystem like ours, where innovation thrives, 5G unlocks new possibilities: immersive classrooms, seamless global collaboration, and enhanced creative expressions in media, design, and the performing arts. Just as literature mirrors life, 5G mirrors our futuristic aspirations, bridging distances and bringing the world closer in an era of hyper-connectivity.

However, with such advancements come challenges that warrant critical discussion. Infrastructure readiness, cybersecurity, and the widening digital divide must be addressed to ensure that 5G remains an inclusive tool for progress rather than a privilege for the few. Ethical concerns surrounding data security and sustainability should be at the forefront of this technological leap.As we embrace this digital transformation, let us not only celebrate its potential but also engage in meaningful conversations about its implications. We invite students, faculty, and members of our broader community to share their insights and experiences as we collectively navigate this exciting shift. After all, technology, much like literature, reflects human ambition and creativity, shaping the world we envision for the future.

**Ms. Pragnya Paramita Samanta**

# BOARD OF EDITORS

# FEATURE STORY

## 5G : CONNECTING DREAMS AND POWERING PROGRESS

Since the dawn of civilization, communication has been the foundation of human progress. From ancient symbols and spoken language to modern telecommunications, the ability to share information has shaped the course of history. Over time, innovations like the telegraph and telephone revolutionized global connectivity, making long-distance communication faster and more efficient. The emergence of radio and television further transformed the way people accessed information, entertainment, and education, shrinking the world into a more connected community.

The latter half of the 20th century saw the rise of mobile telephony, eliminating the need for fixed-line communication. India's telecom revolution began with 2G in the 1990s, making mobile phones affordable for the masses and fostering connectivity across both urban and rural landscapes. 3G introduced mobile internet and video calling, but its reach remained limited due to cost and infrastructure challenges. The true game-changer was 4G, which enabled high-speed internet, mobile banking, streaming services, and the explosion of social media. Jio's entry into the market in 2016 made data more affordable and accessible, ushering in a new digital era for India.

As digital demands continue to grow, 5G is set to be the next transformative leap. More than just an upgrade, 5G offers ultra-low latency, higher bandwidth, and the capacity to connect a vast number of devices simultaneously. It has the potential to revolutionize industries, including education, healthcare, manufacturing, and smart cities. Virtual classrooms, AI-driven automation, and real-time telemedicine will become more efficient and widespread. However, India faces significant challenges in 5G deployment, including infrastructure readiness, spectrum allocation, and affordability.

While metropolitan cities like Delhi, Mumbai, and Bengaluru are gearing up for 5G, rural areas may take years to experience its full benefits. One of 5G's most promising applications is in healthcare, where real-time data processing and low latency can enable remote robotic surgeries and advanced telemedicine services. Education will also be transformed, with augmented and virtual reality enhancing remote learning experiences. In manufacturing, AI-driven automation and smart factories will improve efficiency and productivity. Autonomous vehicles and smart traffic management systems could also become a reality, provided that road infrastructure and regulations evolve accordingly. Despite its vast potential,


5G deployment requires substantial investment. Setting up the necessary infrastructure, including small cell towers and fiber-optic networks, is both expensive and time-consuming. Additionally, there are concerns about the potential health risks of prolonged exposure to electromagnetic radiation. While 5G emits non-ionizing radiation, which is considered safe at regulated levels, long-term studies on its effects are still ongoing. The World Health Organization (WHO) has stated that there is no conclusive evidence linking 5G radiation to serious health issues, but the debate continues.

# STUDENT SURVEY

## 5G : CONNECTING DREAMS AND POWERING PROGRESS

Globally, countries like the United States, South Korea, and China have aggressively adopted 5G. South Korea has implemented 5G-powered smart cities and AI-driven traffic management systems, while China is leveraging it for industrial automation and defense applications. The United States is focusing on 5G-driven innovations in healthcare and military communications. These success stories highlight how strong infrastructure and regulatory support can unlock 5G's full potential.As India moves toward embracing this technological leap, the question remains:
Is 5G the breakthrough we have been waiting for, or are we stepping into an uncharted experiment with unforeseen consequences? Only time will tell, but one thing is certain—5G is set to reshape the way we connect, innovate, and build the future.

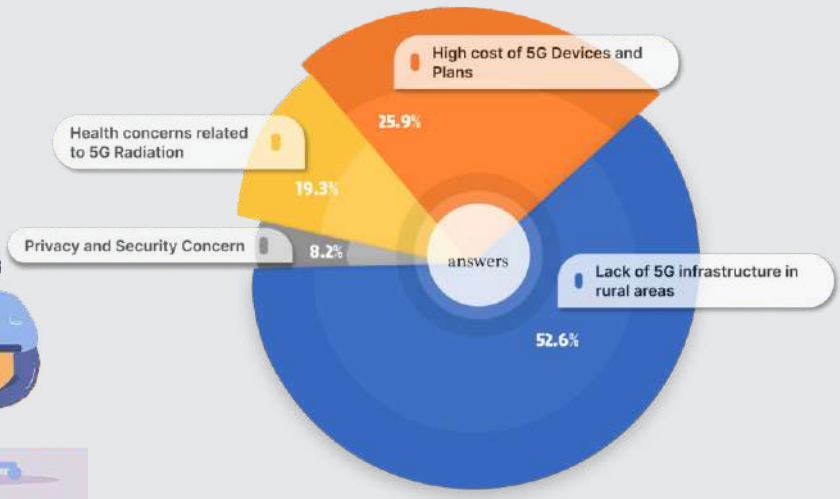
The world is racing ahead with 5G, revolutionizing industries from smart cities and healthcare to education and automation. Global leaders like the USA, China, and South Korea have already harnessed its power, while India continues to navigate challenges such as high costs, infrastructure gaps, and uneven accessibility. With 4G struggling against slow speeds and network congestion, 5G is more than just an upgrade—it's a paradigm shift. Ultra-fast internet, real-time connectivity, and limitless innovation promise to redefine industries, fuel AI breakthroughs, and propel India toward a smarter, more connected future. But are we truly ready to embrace this transformation?

To explore this question, we conducted a survey among undergraduate students—the very minds that will shape India's digital landscape. Their insights reveal not only enthusiasm for 5G adoption but also concerns over affordability, privacy, and implementation challenges.

This initiative was more than an academic exercise; it provided a platform for young innovators to voice their perspectives on the technology that will define the next decade. Their responses, highlighted below, offer a glimpse into the aspirations, apprehensions, and expectations of the future engineers, scientists, and entrepreneurs driving India's tech revolution.

As the nation gears up for its 5G transition, one thing is clear: the youth are ready to lead the charge. The real question is, will infrastructure, policies, and investments keep pace?

**Ques. How do you think is the biggest challenges in implementing 5G in India?**



# FEATURE STORY


## Dr. Sukant K. Mohapatra

**Ex CTO: Ericsson (An International TelecomCompany)**
**Leadership Role: AT&T, Lucent Technologies & Bell Lab**

**The 5G Revolution: Insights from Dr. Sukant Mohapatra**

The rise of 5G technology marks a significant milestone in global connectivity, with the potential to revolutionize industries, reshape economies, and enhance everyday life. India takes its first steps into the 5G era, discussions surrounding its benefits, challenges, and long-term impact continue to engage experts and policymakers. Given the critical importance of this transformation, this issue features 5G as a central topic of exploration.
As India takes its first steps into the 5G era, discussions surrounding its benefits, challenges, and long-term impact continue to engage experts and policymakers. Given the critical importance of this transformation, this issue features 5G as a central topic of exploration.

To provide our readers with exclusive insights, Managing Editor, NIST Chronicle (NC), Dr. Ratikanta Nayak, engaged in a candid conversation with Dr. Sukant Mohapatra (SKM), a leading authority in telecommunications. With over 30 years of experience, including leadership roles at AT&T, Lucent Technologies - Bell Labs, and Ericsson as Chief Technology Officer (CTO), Dr. Mohapatra has been at the forefront of Next-Generation Networks, 5G/6G research, and future communication technologies. His contributions have significantly advanced network planning, optimization, and applications such as IoT, network virtualization, and immersive XR technologies.

In this exclusive interview, Dr. Mohapatra shares new perspectives on India's 5G rollout, the opportunities it presents, and the challenges ahead. He also addresses whether 5G is the technological breakthrough it promises to be or if concerns regarding long-term exposure to non-ionizing radiation warrant further study. This conversation sheds light on the present and future of 5G, helping our readers understand why this technology is at the heart of today's digital revolution.From transforming healthcare delivery to enabling smarter infrastructure, 5G is poised to touch every aspect of our lives. As we step into this high-speed era, informed

# 5G - CONNECTING DREAMS & POWERING PROGRESS

NC: Your journey in telecommunications spans over three decades. How have you seen the evolution from early networks to today's 5G era?

SKM: Yes, I have witnessed the evolution of telecommunications over the decades. I was fortunate to work at Bell Laboratories, NJ, USA, where Alexander Graham Bell invented the telephone in 1876. I have seen an era where wireline phones were the primary means of communication, but over time, technology has evolved rapidly. The shift from wireline to wireless has brought both positive changes and disruptions.

Today, we are discussing 5G, 6G, and future communication technologies. Telecommunications is no longer just about remote or mobile communication—it has fundamentally transformed how we live and work. From social media and video messaging to remote work, online education, smart manufacturing, and even remote surgery, all of these are made possible by advancements in telecommunications.

NC: You have worked extensively in Next-Generation Networks and 5G/6G research. Could you elaborate on your contributions and ongoing research in these fields?

SKM: It has been a team effort, but I have contributed through research publications and technological innovations spanning wireline and wireless communications. Some of our research findings and innovations have been implemented in real-world products.Furthermore, collaboration with industry and policymakers is crucial to ensuring that innovations translate into impactful solutions. However, research alone is not enough. Innovation is meaningful only when it addresses real-world challenges in a cost-effective and scalable manner.

The focus should always be on how technology can provide tangible benefits to users and drive positive societal impact.Encouraging young minds to pursue research with purpose is equally important. We must build an ecosystem that bridges the gap between academia, industry, and society.

NC: India has recently launched 5G services in select cities. How does India's 5G adoption compare to global leaders like the US, China, and South Korea?

SKM: India is currently behind countries like the USA, South Korea, and China, which have rapidly adopted 5G. However, given India's vast population, geographic diversity, and existing infrastructure, its 5G rollout is expected to progress at a relatively slower pace.

India is focusing on digital inclusion, healthcare, and agriculture through 5G, while the USA is leveraging it for consumer services, smart homes, and autonomous vehicles. South Korea, on the other hand, is leading in entertainment, smart cities, and industrial applications due to its highly developed 5G infrastructure.

A key area for India is the development of Private Wireless Networks (PWN), where certain wireless spectrum bands should be made available for public and industry use at low or no cost. Countries like the USA have already deployed PWN using the Citizen Broadband Radio Service (CBRS). Real innovation happens when public and industries are directly involved, as we have seen with web technologies. Additionally, Fixed Wireless Access (FWA) should be implemented to provide last-mile connectivity.

NC: Many believe 5G will be a game-changer for India's digital economy. Which sectors will benefit the most from its implementation?

SKM: As mentioned earlier, India is leveraging 5G for digital inclusion, healthcare, and agriculture. However, to maximize its potential, India must ensure policy and spectrum availability for PWN, which will transform industries like retail, logistics, and mining.Fixed Wireless Access (FWA) will also play a crucial role by providing reliable, high-bandwidth connections to small and medium businesses and rural areas, helping bridge the digital divide.Additionally, fostering a robust ecosystem of manufacturing and R&D will be essential for sustainable 5G deployment and long-term technological self-reliance.

# 5G : CONNECTING DREAMS & POWERING PROGRESS

NC: Ultra-low latency and high bandwidth enable applications like autonomous vehicles, IoT, and telemedicine. How feasible is large-scale implementation of these technologies in India?

SKM: 5G's key attributes include:

Ultra-Low Latency (as low as 5ms) High Data Volume (up to 10 Tbps per square km) Peak Data Rates (up to 10 Gbps) Support for 1 Million Devices per Sq. Km Energy Efficiency (10% of current consumption)These capabilities make autonomous vehicles, IoT, telemedicine, and smart manufacturing possible. However, each country prioritizes different areas when deploying 5G. In India, challenges such as regulatory approvals, infrastructure development, and affordability must be addressed for widespread adoption.

NC: What are the biggest challenges for nationwide 5G implementation in India, and how can they be addressed?

SKM: The biggest challenge is 5G coverage in rural and remote areas. Without proper regulatory and financial models, digital divide issues will persist.Moreover, wireless networks rely on massive wireline infrastructure, so investments in fiber-optic networks are critical. India should also focus on Private Wireless Networks (PWN) and Fixed Wireless Access (FWA) to cover the last mile. Small cell technology using millimeter waves will be crucial for densely populated cities to provide high bandwidth.

NC: Some concerns exist about 5G's potential health risks. What is your view on this debate? Is there any scientific basis for these fears?

SKM: 5G uses non-ionizing radiofrequency (RF) energy, similar to heat and FM radio waves. This type of radiation does not damage DNA and is considered safe.The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has set exposure limits for RF fields, ensuring safety. Additionally, 5G follows strict national and international guidelines, making health risks minimal.

NC: With discussions already underway on 6G, what advancements can we expect beyond 5G?

SKM: Work on 6G is already in progress, even though 5G deployment is still ongoing.6G will build on 5G's foundation, incorporating AI-driven networks, ultra-high-speed connectivity, and futuristic applications like holographic communication, digital twins, and Tactile Internet. It is expected to transform human interaction in a hyper-connected world.

NC: India has an ambitious vision for digital transformation and smart cities. How can policymakers, industries, and academia collaborate to accelerate 5G deployment and ensure maximum societal benefits?

SKM: Smart cities encompass various components, such as smart lighting, smart parking, smart healthcare, and safety & security, among others.

5G will undoubtedly play a crucial role in the development of smart cities, as high-capacity and reliable communication is fundamental for deploying diverse smart city applications. Policymakers, thought leaders, regulatory bodies, academia, industries, and user communities can all play pivotal roles in accelerating 5G deployment and realizing its full potential for smart cities.

NC: Looking ahead, will 5G be the defining technology of this decade, or do you foresee another breakthrough?

SKM: Technology is always evolving, bringing both opportunities and disruptions. 5G is fundamentally different from previous generations, as it is based on cloud-native architecture and open networks.However, 5G is not the endgame.

As we move forward, 6G and future communication technologies will take connectivity beyond anything we've imagined, creating a hyper-connected world with unparalleled innovation.

# WELCOME TO NEW FACES OF THE NIST FAMILY

## PROF. PRIYADARSAN PATRA

### VICE CHANCELLOR, NIST UNIVERSITY

NIST UNIVERSITY

NIST University proudly welcomes Prof. Priyadarsan Patra as its new Vice Chancellor. A distinguished academic leader, Dr. Patra holds a Ph.D. in Computer Science from The University of Texas at Austin and was a visiting scholar at Oxford University. With a career spanning academia and industry, he has served in key roles such as Pro Vice-Chancellor at DIT University, Dean at UPES and XIM University, and spent over two decades at Intel Corporation in system architecture and validation. His expertise in academic governance, curriculum design, and institutional development has been instrumental in shaping future-ready institutions.

In his address to the NIST community, Dr. Patra emphasized the importance of leadership in nurturing the next generation of innovators and global citizens. He introduced his "7 Principles of Excellence," outlining strategic initiatives aimed at transforming NIST into a hub of academic excellence, research, and holistic student growth. President Dr. Sukant K. Mohapatra expressed strong confidence in Dr. Patra's vision and leadership to guide the university to greater heights. Dean Dr. P. Rajesh Kumar and Registrar (I/C) Dr. Bishnukar Nayak highlighted the need for academic discipline, collaboration, and a transparent, student-focused ecosystem.

# WELCOME TO NEW FACES OF THE NIST FAMILY

## Dr. Abinash Dutta

**Assistant Professor**
**(Biotechnology)**

Dr. Abinash Dutta earned his Ph.D. from Utkal University in 2020, specializing in redox regulatory mechanisms in silkworms and antioxidant modulation. He holds a Master's in Biotechnology from MSCB University, with a focus on biomimetic nanoparticle synthesis.With over eight years of research experience, his expertise spans Redox Biology, Developmental Biology, Epigenetics, and Host–Pathogen Interactions. He has contributed to product development, holds a patent on transferrin detection in silkworms, and has received multiple Best Presentation Awards. A published author, he has written extensively on advancements in molecular biology and nanotechnology, earning the prestigious BBA Young Investigator Award.The Department of Biotechnology proudly welcomes him as an Assistant Professor and looks forward to his positive impact on academics and research.

## Dr. Arun Kumar Marandi

**Assistant Professor**
**(Computer Science & Engineering)**

Dr. Arun Kumar Marandi holds a Ph.D. from NIT Jamshedpur, specializing in software quality improvement and cost reduction. He earned his M.Tech from MNNIT Allahabad, where he developed the "EDU–SERV" project.With over 15 years of experience in industry and academia, his expertise spans Software Engineering, Data Analysis, Cloud Computing, AI, and IoT. He has numerous international publications, secured patents in AI–driven hospital monitoring, IoT–based meteorological prediction, and robotic queue management, and authored a book on Network Security.A regular presenter at global conferences, his contributions have significantly impacted academia and technological innovation. The Department of Computer Science & Engineering at NIST University proudly welcomes him as an Assistant Professor and looks forward to his positive influence on teaching, research, and innovation.

## Dr. Bibhudutta Mishra

**Assistant Professor**
**(Biotechnology)**

Dr. Bibhudutta Mishra earned his Ph.D. from BITS Pilani, K.K. Birla Goa Campus in 2021, specializing in RNA and protein structure variations in dengue pathogenicity and drug screening using bioinformatics. He holds an M.Sc. in Life Sciences from NIT Rourkela, where he researched gene expression in breast cancer.Dr. Mishra has experience as an Assistant Professor at Centurion University and as a Project Research Scientist at AIIMS New Delhi. His expertise spans virology, bioinformatics, and drug discovery. Recognized for his research, he received first prizes at AIIMS Research Day 2023 and the GIAN Workshop 2018.The Department of Biotechnology proudly welcomes Dr. Mishra and looks forward to his valuable contributions to academic and research advancements.

## Dr. Amruta Pattnaik

**Assistant Professor**
**(Electrical Engineering)**

Dr. Amruta Pattnaik earned her Ph.D. from TERI SAS, Delhi in 2020, specializing in the performance enhancement of c–Si solar cells. She holds an M.Tech in Power Electronics and Drives from ITER, S'O'A University, Bhubaneswar.With 16 years of teaching and research experience, her expertise lies in power electronics and renewable energy. She has served as a session chair at ISSETA 2023, NIT Meghalaya, and is a subject expert for NTA Delhi and BOSSE Sikkim.Dr. Pattnaik has published several research papers in reputed journals and actively collaborates on projects promoting sustainable energy solutions. She is passionate about mentoring students and guiding them toward research excellence. Her work aligns with advancing green technologies and fostering innovation in the energy sector.The Department of Electrical Engineering warmly welcomes Dr. Pattnaik and looks forward to her valuable contributions to academics and research.

# WELCOME TO NEW FACES OF THE NIST FAMILY

## Dr. Rankanidhi Sahu

**Emeritus Professor (Physics)**

With over 43 years of teaching experience, Dr. Rankanidhi Sahu is a distinguished academic in theoretical physics. He earned his Ph.D. from Berhampur University in 1982, specializing in spin states in the rare earth region.A prolific researcher, Dr. Sahu has published 70+ SCI papers and led 11+ funded projects from SERB/DST, UGC, and BRNS. In recognition of his contributions, he was honored with the prestigious Samanta Chandra Sekhar Award in 2010.Dr. Sahu now joins NIST University as an Emeritus Professor. His expertise is set to elevate research activities at the university and inspire young researchers toward excellence.

## Dr. Trinath Sahu

**Emeritus Professor (Electronics and Comm. Engg.)**

Dr. Trinath Sahu, a distinguished researcher with over 50 years of experience, earned his Ph.D. in Tetrahedrally Coordinated Semiconductors from Berhampur University in 1982. He has guided 12 Ph.D. scholars and published 123 research papers, including 76 in SCI-indexed journals.A British Commonwealth Fellow at Bangor University, UK, and a Post-Doctoral Associate at the University of Antwerp, Belgium, Dr. Sahu has chaired global conferences and reviewed for leading journals.Now joining NIST University as an Emeritus Professor, his vast expertise will enrich and inspire research activities at the university.

## Ms. Indumati Mohapatra

**Placement Executive (Placement)**

Ms. Indumati Mahapatro holds an MBA from the NIST Institute of Science and Technology (2023) and is currently pursuing a Ph.D. at NIST University, focusing on the impact of micro-learning and just-in-time training in the workplace.With 1.8 years of experience, her expertise lies in human resource management. She is an NPTEL Silver Elite-certified professional, showcasing her commitment to continuous learning. Her passion for people management and training innovation makes her a valuable addition to the placement outcome at the University

## Mr. Bhabani Prasad Mishra

**Assistant Professor (Computer Science and Engineering)**

Mr. Bhabani Prasad Mishra is currently pursuing his Ph.D. at Pandit Deendayal Energy University, Gujarat, focusing on efficient vehicular communication in platoons. He holds an M.Tech in Computer Science and Engineering from NIST, Berhampur, specializing in wireless sensor networks.With over seventeen years of experience in industry and academia, his expertise spans AI, Machine Learning, Data Science, and IoT. His research contributions add significant value to the department. The Department of Computer Science and Engineering warmly welcomes him and looks forward to his impactful contributions.

## Mr. Jitendra Kumar Das

**Laboratory Instructor (Computer Science and Engineering)**

Mr. Jitendra Kumar Das holds a Master's in Computer Applications from NIST (Autonomous), Berhampur, where he developed an "Online Breakdown Assistance App" as his master's project. With a keen interest in teaching and practical learning, he brings six months of academic experience to the Department of Computer Science & Engineering. The department warmly welcomes him and looks forward to his valuable

# WELCOME TO NEW FACES OF THE NIST FAMILY

## Ms. Laxmi Sahu

**Laboratory Instructor**
**(Computer Science and Engineering)**

Ms. Laxmi Sahu holds a Master's in Computer Applications from NIST, where she developed a "Multi-Layered Encryption System for Secure Communication" as her master's project. With seven years of teaching experience, she brings practical expertise and a passion for education to the CSE department. Beyond academics, she enjoys cooking, traveling, and spending time with friends. The department looks forward to her

## Mr. Sudhansu Sekhar Panda

**Laboratory Instructor**
**(Computer Science and Engineering)**

Mr. Sudhansu Sekhar Panda holds a Master's in Computer Applications from GITA Autonomous College, Bhubaneswar. His master's project involved developing "E-Raktkosh," a full-stack MERN website. With expertise in web development and a passion for teaching, he brings hands-on experience to the CSE department. His enthusiasm for software development enhances students' practical learning. The department looks forward to his valuable contributions.

## Mr. T. Sairam Subudhi

**Laboratory Instructor**
**(Computer Science and Engineering)**

Mr. T. Sairam Subudhi holds a Master's in Computer Applications from Roland Institute of Technology, Berhampur, where he worked on the "Human Resource Management System" project. He has two years of professional experience at Shriram Life Insurance and as a Desktop Support Engineer. His interests include Networking (CCNA), Python, Java, Software Engineering, and Machine Learning. The Department of CSE looks forward to his meaningful contributions.

## Mr. Sachit Kumar Nayak

**Laboratory Instructor**
**(Computer Science and Engineering)**

Mr. Sachit Kumar Nayak earned his B.Tech in IT from Odisha University of Technology & Research, Bhubaneswar, in 2023. His expertise lies in software development, web and application development, and IT infrastructure automation. His undergraduate project focused on multi-disease prediction using machine learning. He has joined NIST University as a Laboratory Instructor in CSE

## Mr. Aswinee Kumar Mahapatra

**Web Developer**
**(NIST IT Center)**

Mr. Aswinee Kumar Mahapatra holds an MCA from United School of Business and Management, completing his degree in 2023. He has experience as a Software Developer at Tetra Lance Pvt. Ltd. and currently serves as a Web Developer at NIST University. His projects include an Automated Backup and Data Recovery System, a Personalized E-commerce Recommendation System, and an Automated Social Media Posting Tool. His interests span Big Data, Cloud Technology, Distributed Computing, and Machine Learning.

## Mr. Chitranjan Kumar Nirala

**UI/UX Designer**
**(NIST IT Center)**

Mr. Chitranjan Kumar Nirala holds a B.Tech in CSE(AI) from Techno India University. He has joined the IT Department at NIST University as a UI/UX Designer. With a user-centric and creative approach, he is passionate about crafting intuitive digital experiences. He has worked on various projects, including a University Placement Management Portal, a Real-Time Chat App, and a Fake News Detection System.

# INNOVATION & RESEARCH FRONTIER

## PATENT PUBLISHED

- **Dr. Manjushree Nayak,** Associate Professor, Department of Computer Science and Engineering, has published a patent entitled "Intelligent Monitoring System for Visually Impaired People to Detect Obstacles Using Smart Blind Stick (SBS)" with Indian Patent Application No. 202441093182 A in December 2024. The inventors are Dr. Sangam Malla, Dr. Prabhat Kumar Sahu, Dr. Manjushree Nayak, Dr. Smita Rath, Dr. Mitrabinda Khuntia, and Manish Chandra Roy.

## JOURNAL PUBLICATION

- **Dr. B. Sambi Reddy and Dr. Prajapati Naik,** Associate Professors, Dept. of Mechanical Engineering, have published a research article titled "Hybrid Composite Materials from Crotalaria and Borassus Fibers: Mechanical and Water Absorption Properties" in the Journal of Solid Waste Technology and Management in Dec. 2024. The authors of the article are T. Ramu, Prajapati Naik, and B. Sambi Reddy.

- **Dr. Barada Prasad Sethy,** Assistant Professor, Dept. of Civil Engineering, has published a research article titled "Prediction of Swelling Pressure of Expansive Soil Using Machine Learning Methods" in the Asian Journal of Civil Engineering in Oct. 2024. The authors of the article are Sumit Gahlot, Rajat Mangal, Abhishek Arya, Barada Prasad Sethy, and Krushna Chandra Sethi.

- **Dr. Barada Prasad Sethy,** Assistant Professor, Dept. of Civil Engineering, has published a research article titled "Optimizing Construction Time, Cost, and Quality: A Hybrid AHP NSGA III Model for Enhanced Multi-Objective Decision Making" in the Asian Journal of Civil Engineering in Dec. 2024. The authors of the article are Barada Prasad Sethy, Priyanka Gupta, Abhishek Chandra, Krushna Chandra Sethi, Amir Prasad Behera, and Kamal Sharma.

- **Dr. Kunjabihari Swain,** Associate Professor, and Dr. Murthy Cherukuri, Professor, Dept. of Electrical Engineering, have published a research article titled "A Hybrid Approach for Power Quality Event Identification in Power Systems: Elasticnet Regression Decomposition and Optimized Probabilistic Neural Networks" in Heliyon on 30th Sep. 2024. The authors of the article are Indu Sekhar Samanta, Pravat Kumar Rout, Kunjabihari Swain, Murthy Cherukuri, Subhasis Panda, Mohit Bajaj, Vojtech Blazek, Lukas Prokop, and Stanislav Misak.

- **Dr. Kunjabihari Swain,** Associate Professor, and Dr. Murthy Cherukuri, Professor, Dept. of Electrical Engineering, have published a research article titled "Fuzzy Markov Model for the Reliability Analysis of Hybrid Microgrids" in Frontiers in Computer Science on 10th Jun. 2024. The authors of the article are Kunjabihari Swain, Murthy Cherukuri, Indu Sekhar Samanta, Abhilash Pati, Jayant Giri, Amrutanshu Panigrahi, Hong Qin, and Saurav Mallik.

- **Prof. Santosh Kumar Panda, Dr. Aswini Kumar Khuntia, and Dr. Souren Misra,** faculty members of the Dept. of Mechanical Engineering, have published a research article titled "Two-Phase Flow Measurement Through Orifice-Meter with Regression Analysis" in the International Journal of Fluid Mechanics Research. The researchers are Aswini Kumar Khuntia, Santosh Kumar Panda, and Souren Misra.

- **Dr. Subrata Kumar Sahu,** Associate Professor, Dept. of Mathematics, has published a research article titled "Inclusion of Two Summability Methods for Improper Integral" in the Journal of Advanced Studies in Contemporary Mathematics (ASCM) in Nov. 2024. The researchers are Subrata Kumar Sahu, Deepak Acharaya, Umakanta Misra, Laxmi Rathour, Lakshmi Narayan Mishra, and Vishnu Narayan Mishra.

- **Dr. Runu Sahu,** Assistant Professor, Dept. of Mathematics, has published a research article titled "Chemical Reaction, Electrification, Brownian Motion, and Thermophoresis Effects of Copper Nanoparticles on Nanofluid Flow with Skin Friction, Heat, and Mass Transfer" in the East European Journal of Physics in Dec. 2024. The researchers are A.K. Pati, M.M. Rout, and Runu Sahu.

- **Dr. Deepak Acharya,** Assistant Professor, Dept. of Mathematics, has published a research article titled "Inclusion of Two Summability Methods for Improper Integral" in the Journal of Advanced Studies in Contemporary Mathematics in Nov. 2024. The researchers are Subrata Kumar Sahu and Deepak Acharya.

- **Dr. Ashwini Kumar Behera,** Assistant Professor, Dept. of Physics, has published a research article titled "Plasma Screening Effect on H-Atom within the Model of Manning-Rosen Interaction" in the European Physical Journal Plus in Sept. 2024. The researcher is A. K. Behera.

# INNOVATION & RESEARCH FRONTIER

- **Dr. Ashwini Kumar Behera,** Assistant Professor, Dept. of Physics, has published a research article titled "An Exact Treatment of Localization of Electromagnetic Plus Separable Potential" in the Revista Mexicana de Física1 in Sep. 2024. The researchers are A. K. Behera, B. Swain, U. Laha, and J. Bhoi.

- **Dr. Shrabani Mahata,** Associate Professor, Dept. of Chemistry, has published a research article titled "Revitalizing the Tourism Industry of Madhya Pradesh: Opportunities, Challenges, and Government Policies" in the International Journal of Academic Research in Oct. 2024. The researchers are A. P. Khedulkar, S. Bolloju, L. K. Pradhan, B. Pandit, U. T. Nakate, S. S. Mahato, and S. Mahata.

- **Dr. Sabyasachi Rath,** Professor, Dept. of Management Studies, has published a research article titled "Synergistic Effects of Fe and Ag Doping on the Structural and Optical Properties of a TiO2 Thin Film: A Dual Function Platform for Hydrogen Generation and Dye Degradation" in Dalton Transactions, on 28th Sept. 2023. The researchers are Suman Kalyan Chaudhury, Sukanta Sarkar, Sabyasachi Rath, and K. Harun.

- **Dr. Sabyasachi Rath,** Professor, Dept. of Management Studies, has published a research article titled "Contemporary Issues and Challenges of Institutional Finance in Bihar: An In-Depth Study" in the International Journal of Innovative Science and Research Technology in Sept. 2023. The researchers are Sukanta Sarkar, Suman Kalyan Chaudhury, Sabyasachi Rath, and Lingarja Prasad Pattnaik.

- **Dr. Sasmita Padhy and Dr. Preeti Ranjan Sahu,** faculty members of the Dept. of Electrical Engineering, have published a research article titled "Resilient and Sustainable PD-(1+ PI) Controller for a Smart Grid in Uncertain Environments" in Electrical Energies, pp. 1-15, in Dec. 2024. The researchers are U.P. Rath, S. Padhy, P.R. Sahu, R.K. Khadanga, B.R. Prusty, and S. Panda.

- **Dr. Manoj Kumar Pradhan,** Assistant Professor, Dept. of Chemistry, has published a research article titled "Advances in Synthesis, Medicinal Properties, and Biomedical Applications of Pyridine Derivatives: A Comprehensive Review" in the European Journal of Medicinal Chemistry Reports on 5th Sep. 2024. The researchers are Duryodhan Sahu, P.S. Rama Sreekanth, Prasanta Kumar Behera, Manoj Kumar Pradhan, Amit Patnaik, Sachin Salunkhe, and Robert Cep.

## CONFERENCE

- **Dr. Bibhudutta Mishra,** Assistant Professor, Dept. of Biotechnology, presented a paper entitled "Identification of Potent Small Molecules as Ligands to Exhibit Potential Binding to the Protease of Coronaviruses" at VIROCON 2024 (Indian Virological Society) on 12th Nov. 2024.

- **Dr. Abinash Dutta,** Assistant Professor, Dept. of Biotechnology, presented a paper entitled "Tasar Silkworm, Antheraea Mylitta as a Model Organism: AntimiRNA-bDNA-Based Strategy to Target Cancer" in an International Conference and Workshop on "New Approach Methodologies (NAMs) in Pharmacology and Toxicology Testing" organized by Mahatma Gandhi Medical Advanced Research Institute - Sri Balaji Vidyapeeth, Puducherry, India, from 5th to 7th Dec. 2024.

- **Dr. Kunjabihari Swain,** Associate Professor, and Dr. Murthy Cherukuri, Professor, Dept. of Electrical Engineering, presented a paper entitled "Enhanced Seizure Detection through a Robust Denoising Autoencoder with Attention Mechanism" at the 2024 Second International Conference on Networks, Multimedia and Information Technology (NMITCON), in Sep. 2024.

- **Dr. Murthy Cherukuri,** Professor, and Dr. Kunjabihari Swain, Associate Professor, Dept. of Electrical Engineering, presented a paper entitled "Epileptic Seizure Detection Using Denoising Autoencoder" at the 2024 International Conference on Emerging Systems and Intelligent Computing (ESIC), in Sep. 2024.

- **Dr. Murthy Cherukuri,** Professor, and Dr. Kunjabihari Swain, Associate Professor, Dept. of Electrical Engineering, presented a paper entitled "Real-Time Incident Monitoring for Smart Cities Using IoT" at the 2024 International Conference on Emerging Systems and Intelligent Computing (ESIC), in Sep. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, presented a paper entitled "AI-Powered Dermatology: Revolutionizing Skin Cancer Detection through Machine Learning Algorithms" at the 2024 International Conference on Cybernation and Computation (CYBERCOM), in Nov. 2024.

- **Dr. Ashwini Kumar Behera,** Assistant Professor, Dept. of Physics, presented a paper entitled "pd Scattering for the q-Deformed Hulthén Potential" at the 68th DAE Symposium on Nuclear Physics, in Dec. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, presented a paper entitled "Integrating Eye Gaze Estimation with the Internet of Medical Things (IoMT) for Individualized and Efficient Healthcare" at the 2024 2nd World Conference on Communication & Computing (WCONF), in Jul. 2024.

- **Dr. Susmita Mahato,** Associate Professor, Department of Computer Science and Engineering, presented a paper entitled "Race-Stega: A Racing Game-Based Information Hiding Scheme" at the 2024 International Conference on IoT-Based Control Networks and Intelligent Systems (ICICNIS), on 18th Dec. 2024.

- **Dr. Sabyasachi Rath,** Professor, Department of Management Studies, presented a paper entitled "Sustainable Solutions: Transitioning to a Green Energy Economy — Indian Initiatives and Impact" at the International Scientific Conference on Sustainable Environment: Transition to Green Energy Systems (ICICNIS), on 6th Dec. 2024.

## BOOK CHAPTER

- **Dr. Yerra Shankar Rao,** Assistant Professor, Department of Mathematics, has published a book chapter entitled "An Epidemiological Model of the Monkeypox Virus and Its Quarantine Effects" in the book "Mathematical Methods in Medical and Biological Sciences" by Elsevier on 11th Nov. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, has published a book chapter entitled "Artificial Intelligence Using Federated Learning" in the book "Artificial Intelligence Using Federated Learning: Fundamentals, Challenges, and Applications" by CRC Press on 12th Dec. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, has published a book chapter entitled "Revolutionizing Energy Storage in Electric and Hybrid Vehicles" in the book "Artificial Intelligence Techniques for Sustainable Development" by CRC Press on 19th Dec. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, has published a book chapter entitled "Participation in the Community and Education" in the book "Developing AI, IoT, and Cloud Computing-Based Tools and Applications for Women's Safety" by Chapman and Hall/CRC on 5th Dec. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, has published a book chapter entitled "Unlocking Business Insights: Leveraging the Synergy of Business Intelligence and Artificial Intelligence for Effective Data Analytics" in the book "AI in the Social and Business World: A Comprehensive Approach" by Chapman and Hall/CRC on 15th Oct. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, has published a book chapter entitled "Social Welfare and Artificial Intelligence's Role: A Comprehensive Summary of the Study" in the book "AI in the Social and Business World: A Comprehensive Approach" by Chapman and Hall/CRC on 15th Oct. 2024.

- **Dr. Manjushree Nayak,** Assistant Professor, Department of Computer Science and Engineering, has published a book chapter entitled "Image Denoising Using Wavelet Thresholding Technique in Python" in the book "Image Processing with Python: A Practical Approach" by Chapman and Hall/CRC in July 2024.

- **Dr. Sasmita Padhy and Dr. Preeti Ranjan Sahu,** Faculty Members, Department of Electrical Engineering, have published a book chapter entitled "PPA-Tuned PI-PD Controller for a Microgrid in Uncertain Environments" in

## WORKSHOP ATTENDED

- **Dr. Bibhudutta Mishra,** Assistant Professor, Dept. of Biotechnology, attended a webinar organized by the American Chemical Society, entitled "Do General Nucleophilicity Scales Exist?" on 24th Oct. 2024.

- **Dr. Bibhudutta Mishra,** Assistant Professor, Dept. of Biotechnology, attended a webinar organized by Discovery Boulevard, entitled "Molecular Docking Workshop" on 23rd Dec. 2024.

## FDP ATTENDED

- **Dr. Abinash Dutta,** Assistant Professor, Dept. of Biotechnology, attended an AICTE Training and Learning (ATAL) Academy Faculty Development Program entitled "Healthcare and Med Tech: Innovations, Challenges, and Future Directions" organized by Delhi Technological University, India, from 9th Dec. 2024 to 14th Dec. 2024.

- **Dr. Basant Kumar Sahu,** Associate Professor, Dept. of Electrical Engineering, attended an AICTE Training and Learning (ATAL) Academy Faculty Development Program on "Data Science using Python" conducted by the Department of Computer Science and Engineering from 25th Nov. 2024 to 29th Nov. 2024 (One Week), organized by NITTTR Chandigarh and NIST University, Berhampur.


# WORKSHOP, SEMINAR & TALK

## Mastering Research Proposal Writing for Funding Success

Dr. Sibarama Panigrahi, Assistant Professor at NIT Rourkela's CSE Department, delivered an insightful session on crafting impactful research proposals. He shared strategies for aligning research goals with funding priorities to enhance grant success rates. Attendees gained valuable tips on developing compelling proposals and navigating competitive funding landscapes. The session proved enriching for aspiring researchers seeking to secure grants effectively.

## AI-Powered Infrastructure Inspection: A Talk by Dr. Dhanada Mishra

Dr. Dhanada Mishra, Managing Director of RaSpect, Hong Kong, delivered an insightful talk on "AI-Powered Inspection of Built Infrastructure" at our campus. He highlighted RaSpect's Inspectica platform, which integrates AI with autonomous drones, IoT sensors, and microwave holographic imaging for precise and efficient inspections. Dr. Mishra discussed the challenges of traditional inspection methods and shared real-world case studies showcasing AI-driven solutions. His session highlighted AI's role in proactive infrastructure maintenance, inspiring civil engineering students to explore cutting-edge technologies for building smarter, safer cities.

## Dr. Arunanshu Mahapatro's Expert Talk on GeoSpatial AI in Agriculture

Dr. Arunanshu Mahapatro, Associate Professor at VSSUT, Burla, recently delivered an expert talk at NIST University on "GeoSpatial AI in Agriculture." He explored AI-driven geospatial technologies for crop management, soil health monitoring, and weather prediction, emphasizing their role in enhancing productivity and ensuring sustainable farming. The session offered valuable insights into AI's transformative impact on agriculture, addressing food security and paving the way for smarter farming

## Dr. B Rajanarayan Prusty Shares Research Paper Writing Strategies at NIST University


Dr. B Rajanarayan Prusty, Professor & Dean (Research) at Galgotias University and a proud NIST alumnus, delivered an insightful talk on "Research Paper Writing: Tips and Strategies to Enhance Research Visibility." He guided students through structuring manuscripts, selecting impactful topics, and aligning with journal expectations. Emphasizing clarity, proper citations, and staying updated with research trends, the session reinforced NIST's commitment to academic excellence, equipping scholars with essential skills for successful publications.

# START-UP & INDUSTRY COLLABORATION

## Odisha TEC Conclave – 19th October 2024

The Technology Enablement Center (TEC), a DST initiative aimed at fostering collaboration by sharing institutional resources and equipment, hosted its Odisha chapter conclave at KIIT TBI. The event served as a dynamic platform for industry–academia interaction, where academic institutions showcased their research capabilities, and industry leaders highlighted pressing challenges in need of innovative solutions. This idea exchange session reinforced the importance of bridging the gap between research and real-world applications, driving productivity and

## MSME and Startup Trade Fair: Accelerating Business to the Next Level – 13th


The MSME Department organized a Startup Trade Fair in Bhubaneswar, where several startups from eastern states showcased their innovative prototypes. A delegation from NIST attended the event to connect with emerging innovators and explore opportunities to support prototype development through the NIST Incubation Foundation. Promising products were identified, with the potential to be integrated with NIST's innovations to create market-ready solutions.

## 20 Nov 2024 — BPUT Carnival: Technology Innovation Challenge


BPUT, as part of its annual fest, organized a tech carnival at Nalanda Institute of Technology, Chandaka. The CEO of NIST Incubation Foundation, Prabhas Raj, attended the event as one of the jurors, alongside several other dignitaries.

## TEC Connect and Convergence – 14th November 2024

The monthly TEC Convergence Meet was organized at KIIT-TBI, bringing together institutes from Odisha, Jharkhand, West Bengal, and the Northeast states to exchange ideas aimed at enhancing collective research productivity. The conclave highlighted the benefits of a cluster approach, fostering collaboration among geographically proximate institutions. Experts also discussed strategies for optimizing shared research facilities and resources to drive innovation.The event served as a vibrant platform for networking, knowledge sharing, and identifying joint project opportunities. Participants emphasized the need for sustained dialogue and resource alignment to accelerate regional research excellence.

# ARTICLE : SCIENCE/ ENGINEERING/ MANAGEMENT

## THE JOY AND PAIN OF SECURITY IN THE ERA OF GENERATIVE AI, 5G, AND BEYOND NETWORKS

As we stand on the brink of a new technological era, the convergence of Generative AI, 5G, and emerging networks promises unprecedented opportunities. As shown in Figure 1, 5G — the fifth generation of mobile network technology — offers ultra-fast speeds, low latency, and massive connectivity, enabling innovations across industries such as healthcare, automotive, and smart cities. Beyond 5G, the development of 6G networks aims to further revolutionize connectivity with even higher speeds, enhanced capacity, and improved energy efficiency. Generative AI plays a crucial role in these advancements by enabling intelligent decision-making, automating complex processes, and providing real-time insights.

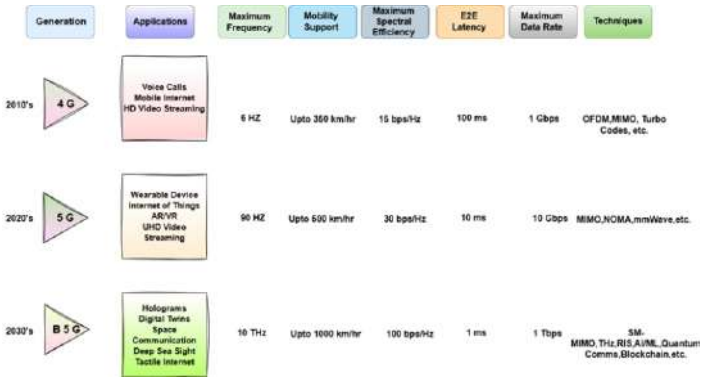



*Figure 1: Generational progress of wireless mobile networks [Source: P. Nath et al.]*

However, these advancements come with their share of challenges, particularly in the domain of security. The expansive connectivity and increased data flow introduce new vulnerabilities, while the sophisticated capabilities of Generative AI can be exploited for malicious purposes. In this blog, let's explore the dual nature of these technologies — how they enhance security measures while simultaneously introducing new vulnerabilities and risks.

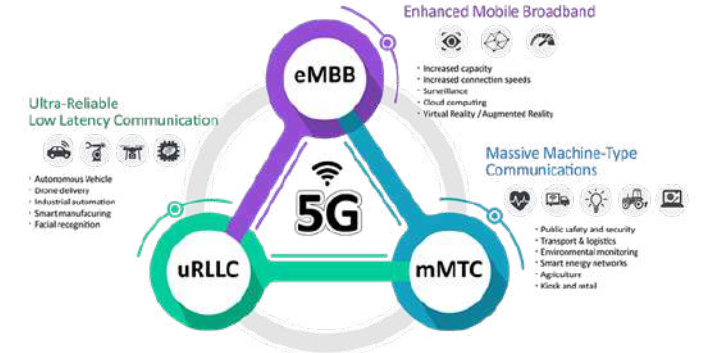



*Figure 2: Different Verticals of Next-Gen Wireless Mobile Networks [Source: humaspssn et al.]*

### 5G Use Case Verticals and Network Segmentation

The next-generation 5G network is designed with the capability to logically segment traffic based on specific use case requirements, as depicted in Figure 2. According to IMT-2020 specifications, 5G network architecture supports three key service categories:

- **Enhanced Mobile Broadband (eMBB)**

Designed to accommodate high-bandwidth applications such as ultra-high-definition (UHD) video streaming, cloud-based gaming, and immersive technologies like augmented and virtual reality (AR/VR).eMBB ensures seamless data-intensive experiences with faster speeds and greater capacity.

- **Massive Machine-Type Communications (mMTC)**

Optimized for applications requiring extensive IoT connectivity with low power consumption and minimal data transmission needs.mMTC supports large-scale deployments of smart sensors, industrial automation, smart cities, and environmental monitoring, ensuring reliable connectivity for billions of devices.

- **Ultra-Reliable Low-Latency Communications (uRLLC)**

Tailored for mission-critical applications demanding near-zero latency and high reliability.uRLLC enables real-time applications such as remote surgeries, autonomous vehicles, industrial automation, and smart grids, where minimal delay and high precision are crucial.

The logical network slicing capability ensures that each vertical receives dedicated network resources optimized for its specific needs, enhancing performance, efficiency, and reliability across diverse 5G-enabled applications.

### The Joy: Gen AI-Powered Threat Detection

The next-gen network's ability to segregate traffic into different logical groups inherently minimizes many security issues. AI-powered threat detection and response systems revolutionize network security by enabling real-time analysis of vast amounts of network traffic. This capability allows for the swift identification and mitigation of threats, significantly reducing the window of vulnerability. According to 5gamericas.org, AI-powered systems can process over

# ARTICLE : SCIENCE/ ENGINEERING/ MANAGEMENT

of 99.9%, reducing false positives by 40%.

**Predictive Maintenance:** AI-driven predictive maintenance allows network operators to foresee potential failures before they occur, minimizing downtime and ensuring the reliability of critical network infrastructure.

**Automated Security Protocols:** The dynamic nature of AI systems allows for automated adjustments to security protocols based on real-time threat assessments. This adaptability enhances the overall resilience of networks, making them more robust against evolving threats.

## The Pain: Emerging Security Challenges

**Increased Attack Surface with 5G:** The expansive connectivity offered by 5G networks introduces more entry points for cyber threats. With the proliferation of IoT devices and the increased reliance on digital connectivity, the attack surface has broadened, making networks more susceptible to breaches. UpGuard highlights the need for enhanced security measures to address these vulnerabilities.

**GenAI as a Tool for Cybercriminals:** While AI enhances security, it also provides cybercriminals with sophisticated tools for conducting attacks. Generative AI can create realistic phishing attacks and deepfakes, complicating the task of threat detection. According to Investopedia, the misuse of AI technology lowers the barrier to conducting complex cyberattacks.

**Vulnerabilities in AI Models:** AI systems themselves are not immune to attacks. Adversaries can target and manipulate AI models integral to network security, leading to potential disruptions. Checkpoint discusses the threats and mitigations associated with AI models in 5G networks.

## Case Studies and Statistics

**GenAI in 5G Network Security:** Case studies reveal the significant impact of AI on 5G network security.AI-driven solutions have demonstrated their capability to process vast amounts of data swiftly and accurately, enhancing the overall security posture of networks.

**Cybersecurity Concerns Among Professionals:** A survey by BitNinja indicates that approximately 72.5% of cybersecurity professionals express high to medium-high concerns over the security implications of 5G technology.

**Exploitation of AI by Hackers:** The same generative capabilities that bolster security are being exploited by hackers to create more sophisticated and convincing cyberattacks. Barron emphasizes the increasing number of threat actors capable of using AI for malicious purposes.

## Navigating the Future: Strategies and Recommendations

**Robust AI Governance:** Implement ethical guidelines and robust governance frameworks to oversee the deployment of AI in security contexts.
Establish clear protocols for the ethical use of AI and ensure accountability.

**Continuous Monitoring and Adaptation:** Continuous monitoring and rapid adaptation to emerging threats are essential.
Organizations should invest in systems that can adapt to new threats in real-time, ensuring security measures remain effective against evolving cyber risks.

**Collaborative Defense Mechanisms:** Collaboration among industry stakeholders is vital for sharing intelligence and developing unified defense strategies. By working together, organizations can enhance their collective security posture and better respond to cyber threats.

## Conclusion

The convergence of Generative AI, 5G, and emerging networks offers a transformative impact on network security. While these technologies provide significant enhancements, they also introduce new challenges. Balancing innovation with vigilant security practices is essential to navigating this complex landscape. As we embrace these advancements, a proactive and collaborative approach will be key to ensuring a secure digital future.Organizations must invest in adaptive security frameworks that evolve alongside these technologies. Continuous research, cross-industry partnerships, and upskilling cybersecurity professionals will be vital in safeguarding next-

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# EVENTS & CLUB ACTIVITIES

## NIST University Hosts Events to Inspire Students

The Cat Club of NIST University organized two impactful events under the guidance of Dr. Akankshya Pattnaik. The Orientation Program, held on August 13–14, 2024, featured brain games to help new students enhance their problem-solving skills. On November 25, 2024, "Mic Drops Upon Your Thoughts" brought 38 students together for a thought-provoking discussion on communal harmony. Both events fostered intellectual growth and social awareness, reflecting NIST's commitment to holistic student development.

## NIST Musical Society Enlivens Campus with Music

From August 2024 to January 2025, the NIST Musical Society organized vibrant events, bringing joy to students and faculty. Orientation 2K24 (August 13) welcomed newcomers, while Acoustic Jamming (August 26) offered a soothing retreat. Electrical Jamming (October 4) boosted new band members' confidence at the Galleria stage, and the Diwali Celebration (October 31) created a festive vibe for hostel students. The grand NIST Fest (January 13, 2025) united faculty and staff at Gopalpur Guest House. Guided by Dr. Preeti Ranjan Sahu, these events enriched campus life.

## NIST Hosts Technical Events to Boost Innovation


Club Excel, NIST University, organized a series of events to enhance technical skills and foster innovation. Sankalp 2023 featured 76 participants in Code Crusade, while the Git & GitHub Workshop (August 4–5) trained 93 students. The Poster Making Competition (August 18) promoted anti-ragging awareness. Events like Overnight Coding (March 25) and the React.js Workshop (March 15, 2024) further enriched learning. Sankalp 2024 introduced Code Crusade 2.0 and Excel Arcade, blending coding with interactive experiences.

## NIST University's Renewable Energy Club Hosts Innovative Technical Events

The Renewable Energy Club (REC) at NIST University kicked off the academic year with impactful events. The Orientation for Batch 2024 (August 13–14) introduced 500–800 students to REC's innovative projects, guided by Dr. Ashwini Kumar Nayak. On August 26–27, REC, in collaboration with the IEEE Student Branch, hosted "Tinker to Tech", where 45 participants built 16 live projects using sensors and microcontrollers. These initiatives bridge theory and practice, fostering hands-on learning in renewable energy and technology.

## NIST Dance Club Energizes Campus with Vibrant Events

The NIST Dance Club (NDC), guided by Dr. Anwesweta Panigrahi, kickstarted the year with dynamic events. The Orientation (August 13–14) and MCA Induction (August 23) provided students with a platform to showcase their talents. The Winter Flashmob (December 3) captivated audiences, while the 31st Night Celebration (December 31) closed the year with electrifying performances. With growing participation, NDC continues to unite students through dance, creativity, and community engagement.

## NSS Club at NIST Leads Social Service Initiatives

The NSS Club at NIST, guided by Md. Riazuddin, organized a series of impactful social service events. The Blood Donation Camp (September 20), held in collaboration with Aama Odisha and Samwad Newspaper,

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collected 150 units of blood. The NSS Day Celebration (September 24) marked 55 years of NSS, while Corruption Awareness Day (November 4) emphasized the importance of integrity. The Joy of Giving (December 8) spread kindness by distributing essentials, reinforcing the club's mission of service and community welfare.

## NIST Robotics Club

The Robotics Club at NIST showcased innovation and technical prowess during SANKALP 2024 with two thrilling events. "Speed Demons" (March 21) challenged students to design and race high-speed robots, promoting teamwork, problem-solving, and engineering creativity. The event received an enthusiastic response, with participants gaining hands-on experience in robotics and optimization strategies. On March 22, "Gesture Battle" pushed the boundaries of human-machine interaction as students developed gesture-controlled robots, integrating AI and real-time control systems. The event impressed faculty and peers alike, encouraging further exploration into robotics. Both competitions highlighted the institute's commitment to cutting-edge technology and practical learning.

## NIST Data Science Club

The Data Science Club at NIST has successfully conducted several impactful events, engaging over


800 students across various programs. Highlights include Sankalp 2024 (March 21) with project showcases and tech competitions, orientation sessions for newcomers (August 13 & September 14), and an induction at Niranjan Govt. Women's College (September 24). A Generative AI Workshop (March 2) provided hands-on learning to 150+ participants. These initiatives foster innovation, collaboration, and active student participation in emerging technologies.

## NIST Multimedia Club


The Multimedia Club at NIST conducted a series of impactful events, enhancing students' digital arts and creative tech skills. The Blender Workshop (Aug 24) offered hands-on 3D modeling and animation training, while the Photoshop Workshop (Oct 26) focused on graphic design and visual communication. During UNIFEST (Jan 20-21), students showcased self-developed games, gaining real-world experience in game development. These initiatives fostered creativity, industry readiness, and collaboration, reinforcing NIST's commitment to innovation in digital media technologies.

## NIST Arts And Drama Club

The Art & Drama Club at NIST hosted a series of vibrant events to foster creativity and student bonding. During Orientation Day (August 13-14), activities like Artistic Arena, Open Mic, and Whimsical Brushes encouraged self-expression through art, performance, and face painting. The Rangoli Competition (October 31), held during Diwali, celebrated cultural diversity with stunning designs. These well-received events promoted inclusivity, confidence, and cultural appreciation, enriching the campus atmosphere with creativity and connection.

## NIST Fashion and Cultural

The Urbane Inauguration Event, held on December 3, 2024, at NIST, marked the vibrant launch of the new cultural club under the guidance of Asst. Prof. Pragnya Paramita Samanta. Attended by NDC and NFCC core members, the event featured a lively ramp walk, igniting excitement among the audience. With strong student

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participation and positive reception, the event highlighted the club's creative vision. Media coverage by Foto Folks and The Mediamovers amplified its reach and impact across campus.

## NIST Counselling Service

The NIST Counselling Service (NCS) organized a series of impactful events to promote student well-being and engagement. Highlights include visits, youth parliament, and stress-relief activities like The Maze Runner, along with Saksham 2024 during Sankalp 2K24. Orientation, counselling, and induction sessions supported 600+ new students, reinforcing NCS's commitment to a supportive campus environment.

## Management Club

The NIST University Club organized vibrant events combining learning and fun. SANKALP 2K24 promoted financial literacy through games like Stock Trader Pro and KBC, while HUNT O MANIA 2K24 encouraged teamwork with an exciting treasure hunt. Foundation Day 2K25 featured interactive games, fostering cognitive skills and student engagement across campus.

## NIST Musical Society: A Year of Harmony and Talent


The NIST Musical Society (NMS) delivered an outstanding year filled with diverse and memorable events. Highlights included patriotic performances on Republic and Independence Days, participation in the Mahanagar Mahotsav, and the signature event, NIST Idol, showcasing top talent. Orientation programs, jam sessions, and festive collaborations like Diwali celebrations brought joy and fostered a vibrant musical culture. With steadfast support from Dr. Preeti Ranjan Sahu, NMS continues to inspire creativity at

## Empowering Change: NSS at NIST Drives Environmental and Wellness Initiatives in 2024

The National Service Scheme (NSS) at NIST University, led by Programme Officer Md. Riazuddin, launched impactful initiatives in 2024 to promote environmental responsibility and wellness. Activities included a Campus Cleanliness Drive, Beach Cleaning, International Yoga Day celebrations, and a Plantation Programme. With over 100 saplings planted, these events emphasized sustainability, mindfulness, and community service, strengthening NSS's commitment to making a positive impact on campus and beyond.

## Empowering Innovation: Data Science Club


The Data Science Club, guided by Ch. Shree Kumar, hosted impactful events throughout 2024, enhancing technical skills and fostering collaboration. Key highlights included Sankalp's Project Showcase, a Generative AI Workshop, and inductions for BTech and MCA students. These events attracted over 700 participants, encouraging innovation and strengthening the data science community at NIST, while also connecting with external institutions to inspire a broader interest in technology and AI. The club's initiatives effectively bridged

# STUDENT SUCCESS STORIES

## Meta Achievers Make Mark at IEEE 2024 with AR/VR Real Estate Innovation

NIST University congratulates Team Meta Achievers — Arvind Kumar Sahu, Kunaal Manda, Chandra Mohanty, and Neekitha Komali — for securing the Runner-Up position in the AR/VR Track at IEEE's Sustainable for Humanity 2024, organized by IEEE Region, the AdHoc Committee on Outreach and Retention, and IEEE India Council.Their project, "AR/VR in Real Estate Business," leverages immersive AR, VR, and AI technologies to revolutionize property exploration. This achievement reflects NIST's dedication to empowering students through cutting-edge education, mentorship, and real-world tech exposure — preparing them to lead innovation across industries.

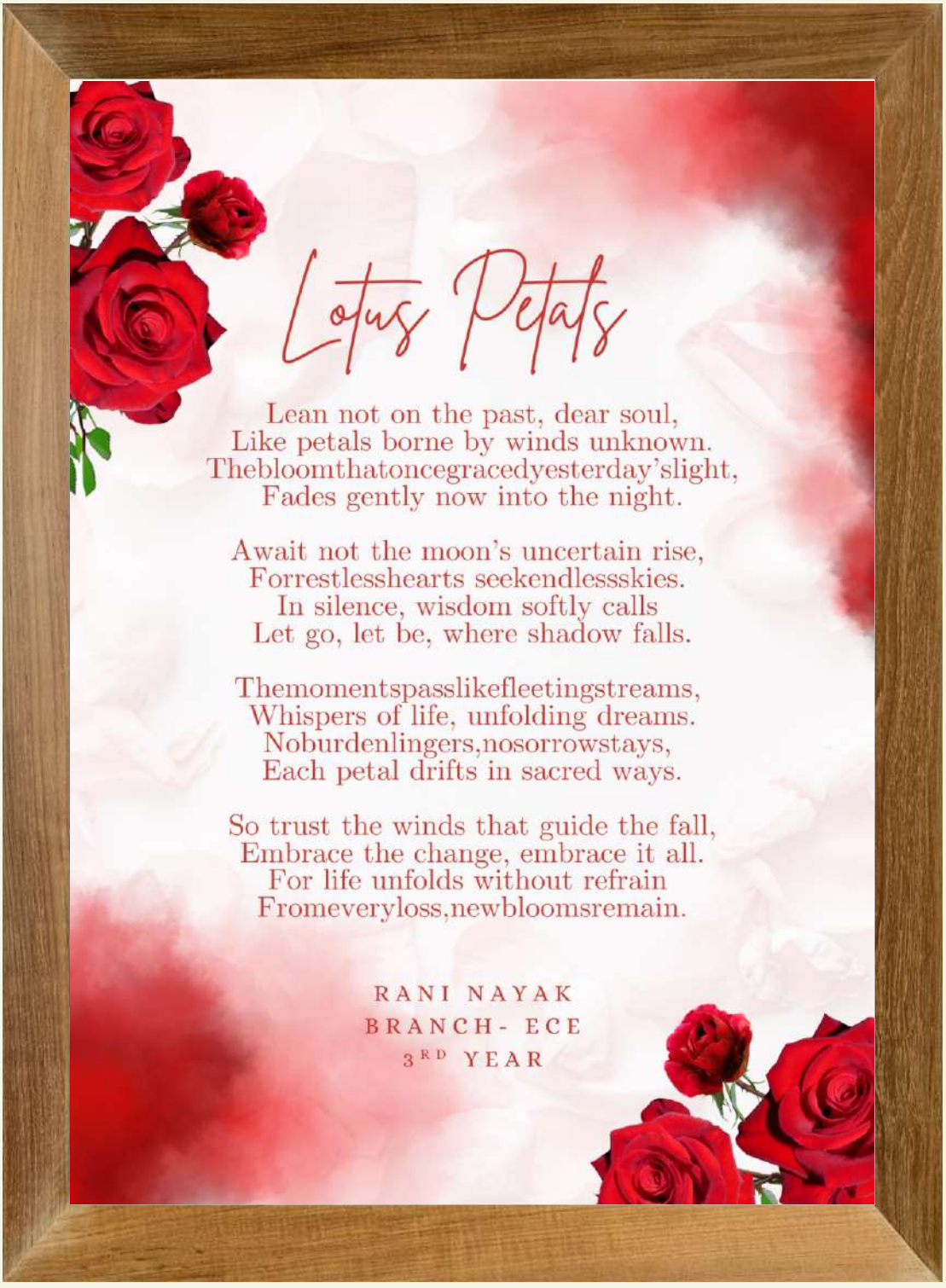

## NIST Students Advance to Top Taiwanese Universities for Semiconductor Research

NIST University proudly celebrates the remarkable achievements of its students in semiconductor research, securing prestigious admissions to top Taiwanese institutions. V. Someswar Rao (ECE) has joined the College of Semiconductor Research at National Tsing Hua University (NTHU), while Ayush Behera (EE) has been admitted to the International College of Semiconductor Technology at National Yang Ming Chiao Tung University (NYCU). Vivek Ranjan (ECE) is now part of the Institute of Nanoengineering and Microsystems (INEMS) at NTHU. These accomplishments reflect NIST's commitment to academic excellence and cutting-edge research, empowering students with global opportunities to shape the future of semiconductor technology.

# LITERATURE, ART & PHOTOGRAPHY

**Literature**

## Poetry



# LITERATURE, ART & PHOTOGRAPHY

## Art & Photography

# ALUMNI SPEAK

**Mr. Vineet Agarwala**
Founder, Blue Horse Software
B.Tech (Information Technology),
Batch: 2001

Vineet Agarwala (VA) is the founder of Blue Horse Software, a company dedicated to empowering businesses online through innovative digital solutions. Since completing his B.Tech in Information Technology in 2001, Mr. Agarwala has pursued an entrepreneurial path, leveraging his technical expertise and business acumen to drive digital transformation for clients worldwide.

**NC: What is your story related to joining NIST?**

**VA:** Like every aspiring engineer, I eagerly awaited my JEE results, hoping for a path that would shape my future. When my ranking came out, I found myself at a crossroads—multiple options, but an uncertain direction. That's when a senior, already studying engineering in Bhubaneswar, strongly recommended NIST. He spoke about the institution's academic rigor, the discipline it instilled, and the culture of innovation.What sealed the decision for me was the opportunity to pursue Information Technology, my preferred branch. It felt like a door opening to a future where technology would be at the center of everything I do. Looking back, joining NIST wasn't just about choosing a college—it was about stepping into an ecosystem that shaped my way of thinking, problem-solving, and approaching the world of technology. That single decision set the foundation for the journey I'm on today.

**NC: What is one remarkable memory with friends that you made while you were at NIST?**

VA: Coming from West Bengal, I initially faced a bit of a language barrier, but that phase didn't last long. Within a couple of days, I had synced in so well that it felt like home. The bonds formed during those years weren't just friendships—they became lifelong connections. Even after 15 years, we're still in regular touch, reliving the good old days.One of the best parts of college life was all the fests and events—a time when the entire campus transformed into a celebration. Whether it was organizing, participating, or simply enjoying the performances, every fest was a grand spectacle. We laughed, danced, and created memories that still bring a smile. Looking back, it wasn't just about the classes, exams, or fests—it was about the friendships that made every experience unforgettable.

**NC: Do you recall any location at NIST that reminds you of getting motivated or changing your course of action?**

VA: The library at NIST was my go-to place for focus and inspiration. It wasn't just about academics but about exploring ideas beyond the syllabus. Another special place was Gopalpur Beach—our escape for deep conversations, brainstorming, and resetting our minds. Even today, we visit it every year or two, reliving those moments of reflection and motivation.

**NC: You must remember your teachers. Who were the key influencers and why?**

VA: Ravi P. Reddy Sir was an inspiring and remarkable figure. Every minute spent around him was a lesson in itself—his vision, discipline, and leadership left a lasting impact that I still treasure.Anisur Rehman Sir played a key role in shaping my career. His passion for coding was contagious, and he pushed us to think beyond textbooks. His influence sparked my deep interest in programming, ultimately helping me become a successful software developer.

**NC: What are your college friends doing nowadays? Are you in touch with them?**

VA: Most of my college friends are now in top MNCs, holding senior positions. We've all taken different career paths, but the bond remains strong. We regularly arrange get-togethers, and when friends working abroad visit India, we make it special—planning 2-3 day trips, reliving our college days, and catching up with everyone in the circle. No matter how busy life gets, these reunions remind us of where it all started.

**NC: If a student of +2 or high school would seek your advice on making a career, what would be your advice? Or maybe you would like to give them a mantra or a few thumb rules?**

# ALUMNI SPEAK

VA: For those interested in IT and software development, my first advice is—start coding. Once you begin and enjoy it, no one can stop you.But beyond coding, here's my success mantra that applies to any career:

- Set Your Goals High – Don't worry about how you'll achieve them initially; just aim big. Once you have clarity, everything else follows.
- Plan for the Day – Spend 10–30 minutes daily planning your priorities. Identify 4–5 key tasks and try to complete them by EOD.
- Learn Something New Daily – Dedicate at least 30 minutes each day to learning.Success isn't accidental—it's built on clarity, planning, and consistent effort.

**NC: Let's say we have invented a time machine and you are authorized to do one round trip. What would you like to change, if possible?**

VA: I am a product of all the right and wrong decisions I've made. The one thing I value most is happiness, and I'm truly happy with who I am and what I do today. So, I wouldn't change much—every experience has shaped my journey perfectly. As they say, "Everything happens for a reason."

**NC: What is your take on earning? Desk job, field job, research, entrepreneurship, or even freeloading: what works best?**

VA: Earning isn't just about making money—it's about doing what you enjoy the most and creating value. For me, entrepreneurship has been the most fulfilling. It's challenging but gives me the freedom to create, innovate, and impact lives.That said, there's no single "best" path—success comes from choosing what fits you best and giving it your all.

**NC: You must remember your teachers. Who were the key influencers and why?**

VA: Ravi P. Reddy Sir was an inspiring and remarkable figure. Every minute spent around him was a lesson in itself—his vision, discipline, and leadership left a lasting impact that I still treasure.Anisur Rehman Sir played a key role in shaping my career. His passion for coding was contagious, and he pushed us to think beyond textbooks. His influence sparked my deep interest in programming, ultimately helping me become a successful software developer.

# 'We aim to create Google-like fun culture ~'Learn-Play-Grow' within organisation'

**RITWIK MUKHERJEE**
KOLKATA, 15 JANUARY

An IT company of decent size in Medinipur? Hyperbole? Not really, if you are talking about BlueHorse Software Solutions Pvt Ltd, the fifteen-year-old company, which is successfully doing businesses all over the country and in many parts of

based out of his home town.

"We're a team of thinkers, designers, architects, geeks, and engineers working together to breathe life into your ideas. We are out on a mission. As an organisation, we aim to create a Google-like fun culture which we call 'Learn-Play-Grow'. Our purpose is to offer a work-life balance by creating

business processes.

▸▸ E-commerce solutions: In order to succeed in today's digital world e-commerce web development is very important. With an effective e-commerce website, businesses can easily provide customers with what they need, when they need it. We have an in-depth understanding of the leading ecommerce platforms to provide ecommerce businesses with the suitable and affordable technology stack like Magento.

▸▸ PWA & Hybrid Mobile App: Progressive web apps (PWAs) and Hybrid mobile apps are web-based applications that mimic the func-

# NIST IN NEWS

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गांव पहुंचने पर शिवेंद्र का हुआ पुरजोर स्वागत

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# NIST Chronicle

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## 5G: CONNECTING DREAMS & POWERING PROGRESS

Officially documenting the **life** of current students at campus and reviving the campus **memories** for alumni.

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