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G.L. BAJAJ INSTITITE OF TECHNOLOGY AND MANAGEMENT

"Studying AI is exploring the future of human potential."

VIVIDHATA CLUB
AI
G.L.BAJAJ

#September 2025

EDITION

PRADYUMAN

NEWSLETTER | COMPUTER SCIENCE ENGINEERING - AI

PRAYUMAN

CONTENT

PRADYUMAN

ABOUT THE INSTITUTE

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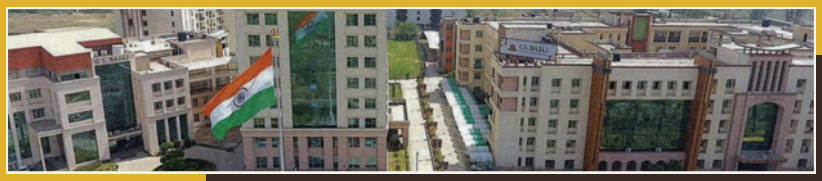
GL Bajaj Institute of Technology and Management, Greater Noida, is a premier institution affiliated with Dr. A.P.J. Abdul Kalam Technical University. Renowned for its practical learning, innovation, and research, it offers modern infrastructure, expert faculty, and strong industry ties, ensuring excellent placements and holistic student development for career and societal contributions.



Message from Director, GLBITM

Dr. Preeti Bajaj

Welcome to GL Bajaj, a place where academics and co-curricular activities come together to shape future technocrats and business leaders. Guided by our vision, we aspire to be a premier hub for teaching, research, and innovation in Engineering and Technology, driven by our steadfast commitment to quality education and training.

At GL Bajaj, we nurture strength of character, confidence, technical excellence, and leadership in our students. This is made possible through our dedicated faculty, a world-class library, cutting-edge laboratories, and modern teaching methodologies that make learning dynamic, engaging, and effective. In an era of globalization and rapid technological change, we continuously evolve to equip our students with the skills and knowledge necessary to excel in an ever-competitive world.

Our strong academic track record and outstanding placement outcomes stand as proof of the diverse talents and achievements of our student community. Alongside academics, we emphasize faculty growth through development programs, seminars, workshops, and conferences, ensuring continuous progress for both students and educators.

I warmly welcome you to GL Bajaj, where your journey toward innovation, excellence, and lifelong success truly begins. Together, let us create a future filled with opportunities, growth, and achievements.

Message from Head of CSE-AI, GLBITM

Dr. Sanjeev Kumar Pippal

G.L. Bajaj Institute of Technology and Management is committed to nurturing strong ethical values such as integrity, respect, discipline, and sound decision-making in our students, fostering a lifelong journey of personal and professional growth.

At the heart of our mission lies the drive to build strong collaborations with industry, academia, and the wider community. By encouraging meaningful exchanges, we strive to bridge the gap between theory and practice, preparing our graduates to confidently embrace the challenges and opportunities of today's world.

We stand firmly by the values of excellence, inclusivity, integrity, and respect for diversity in all our initiatives. Our focus on continuous improvement and innovation motivates us to consistently exceed the expectations of our students, faculty, staff, and stakeholders.

With this unwavering commitment, we aspire to be recognized as a premier institution that produces exceptional professionals and leaders who contribute positively to society. Together, we are shaping the future of education while empowering the next generation of innovators and changemakers.

Meet the Editorial Team

Ms. Bhumika Nirmohi
Faculty Editor
Vividhata Club Coordinator

Riya
Student Editor

Vikas Kumar Jha
Student Editor

Deepika Prasad
Student Editor

PRAJYUMAN

ABOUT DEPARTMENT OF CSE-AI

In today's globalized world, where competition is fierce, we at GL Bajaj proactively address emerging trends by staying ahead in technology, science, and society.

With a strong academic track record, hands-on industrial training, and industry interactions, we ensure our students are ready for the workforce. Our placement record reflects the technical and managerial skills of our diverse student community.

We are committed to excellence through Faculty Development Programs, Seminars, Workshops, and Conferences, keeping everyone at the forefront of their fields.

On behalf of GL Bajaj, we invite you to join us in this journey of growth and success.

CLUB EVENTS

- *An Overview*

TECHNICAL EVENTS

Patent Pulse

- ***On 13th September 2025, the Vividhata Club, in collaboration with the IPR Cell,*** successfully organized an insightful seminar ***"Patent Pulse: Intellectual Property Rights & Patent Filing"***.
- The session featured esteemed speakers ***Mr. Abhishek and Mrs. Fetshi,*** who shared their expertise on ***safeguarding innovations and navigating the patent filing process.*** Their engaging discussion highlighted the importance of intellectual property in fostering innovation, entrepreneurship, and research excellence.

Gear Up 2025

- On ***15th September 2025***, the Vividhata ***Club organized a special event to commemorate National Engineers' Day,*** honoring the contributions of engineers in shaping society and driving innovation.
- The event served as a platform to spread awareness about the significance of the day and ***to inspire students to embrace the values of creativity, problem-solving, and innovation*** that define the engineering profession.
- Through engaging interactions and discussions, ***the celebration reinforced the importance of engineering excellence and highlighted the role of young technocrats in building a better future.***

ASUS ROG 2v2 Showdown

- SPORTS EVENT

- On ***16 September, GL Bajaj Institute of Technology and Management*** witnessed an electrifying transformation as the campus came alive with the ***ASUS ROG 2v2 Valorant Showdown***, organized by the Vividhata Club in collaboration with **Aftermath Ventures.**

- The high-energy, full-day event saw passionate Valorant teams battle it out for a ***grand prize pool of ₹20,000.*** From reflex-driven duels to nail-biting clutch plays, the competition kept the audience on edge, setting a new benchmark for campus esports. The enthusiastic participation and electrifying atmosphere truly showcased the ***growing spirit of esports at GL Bajaj.***

Snaps of the day

EXCELLENCE WALL

- *Student Achievements*

Vidhi Mittal
[Batch 2026]

Shruti Kansal
[Batch 2026]

Mitali Jha
[Batch 2026]

Vidhi Mittal and ***Shruti Kansal***, B.Tech (CSE AI) student at GL Bajaj Institute of Technology and Management, has been placed at ***EPAM*** with a package of ***₹8.4 Lakh CTC***. Their selection reflects their ***proficient problem-solving skills, strong technical foundation,*** and ability to apply innovative thinking to real-world challenges. This achievement also showcases the institute's commitment to nurturing industry-ready professionals.

Mitali Jha, another brillant student from our department CSE AI secured placement at ***Innovaccer***. Her ***selection reflects her dedication, strong command of technology, and ability to turn challenges into opportunities.***She has consistently demonstrated curiosity for emerging technologies, a problem-solving mindset, and the confidence to apply innovative solutions in real-world contexts. This success is a proud moment for her and a testament to the supportive environment of our department.

Outstanding Placements

STUDENT GUEST LECTURE AT RPVV SCHOOL

-LEARNING EXCHANGE

- On ***26th and 27th September 2025***, three students from the Department — ***Vikas Kumar Jha, Yash Raghuvanshi, and Aryan Singh*** — had the unique opportunity to conduct guest lecture session at ***Rajkiya Pratibha Vikas Vidyalaya (RPVV), New Delhi.***
- This opportunity was made possible ***through the guidance and support of our HOD Sir, Dr. Sanjeev Kumar Pippal***, whose constant encouragement motivates students to step beyond the classroom and take on real-world teaching and leadership roles.

- Over the course of two days, the team engaged with enthusiastic ***11th and 12th grade students***, introducing them to ***a wide range of programming concepts.*** The sessions covered:
  - ***Basics of Python Programming***
  - ***Object-Oriented Programming (OOPs) in Python***
  - ***Web Development Fundamentals: HTML, CSS, and JavaScript***
  - ***Advanced topics including jQuery and Bootstrap***
- The lectures not only ***enhanced the students' technical exposure*** but also ***inspired them to explore the exciting world of coding and web technologies.*** This initiative reflected the department's commitment to student-led knowledge sharing and community outreach, while also showcasing the leadership and teaching capabilities of its budding technocrats.

FACULTY CONTRIBUTION

- *An Overview*

Dr. Sanjeev Kumar Pippal
HOD- CSEAI, GLBITM

Internal Smart India Hackathon (SIH) 2025:

- ***On 20th September 2025, Dr. Sanjeev Kumar Pippal, Head of Department CSE-AI and Head of the Hackathon Center successfully conducted the Internal Smart India Hackathon (SIH) 2025*** at GL Bajaj Institute of Technology and Management.
- The round served as an excellent platform for students to present ***innovative solutions to real-world challenges, combining creativity, technical knowledge, and problem-solving acumen.*** Enthusiastic participation reflected the growing culture of innovation among students.

Image Gallery


GPS Map Camera
Greater Noida, Uttar Pradesh, India
Main Campus, Gl Bajaj Institute Of Management And Research, Knowledge Park Iii, Ruhallapur, Greater Noida, Uttar Pradesh 201310, India
Lat 28.472033° Long 77.489044°
20/09/2025 03:38 PM GMT +05:30
Google


GPS Map Camera
Greater Noida, Uttar Pradesh, India
Seminar Hall & Computer Centre, Gl Bajaj Institute Of Management And Research, 2, Knowledge Park Iii, Greater Noida, Uttar Pradesh 201310, India
Lat 28.472846° Long 77.488396°
20/09/2025 02:15 PM GMT +05:30
Google


GPS Map Camera
Greater Noida, Uttar Pradesh, India
Main Campus, Gl Bajaj Institute Of Management And Research, Knowledge Park Iii, Ruhallapur, Greater Noida, Uttar Pradesh 201310, India
Lat 28.472024° Long 77.489045°

Blockchain-Enabled Healthcare: Critical Analysis of Applications, Limitations, and Technical Solutions

Dr. Sanjeev Kumar Pippal, the HOD of the Department of CSE–AI has explored the transformative potential of Blockchain Technology (BT) in healthcare, addressing both its opportunities and challenges. Key highlights include:

- Research Focus: ***Application of blockchain to enhance health information management, ensuring data security, interoperability, and patient empowerment***.
- Case Studies: Real-world implementations analyzed, including MedRec, MediLedger, and Estonia's national eHealth system, demonstrating blockchain's effectiveness in secure health data governance.
- ***Key Applications:***
  - Electronic Health Records (EHRs): Improved security and patient control.
  - Pharmaceutical Supply Chain: Tackling drug counterfeiting through blockchain traceability.
  - Clinical Use Cases: Clinical trial management, patient consent tracking, and insurance claims validation.
- ***Challenges Identified:***
  - *Scalability limitations.*
  - *Complex regulatory compliance (HIPAA, GDPR).*
  - *Integration with existing infrastructure.*
- ***Emerging Solutions: Exploration of permissioned blockchain models, smart contracts, and decentralized identity management frameworks.***
- Impact: Highlights blockchain's potential to revolutionize healthcare, driving security, efficiency, transparency, and patient-centered data governance.

SN Computer Science (2025) 6:824
https://doi.org/10.1007/s42979-025-04360-z

REVIEW ARTICLE

Blockchain-Enabled Healthcare: Critical Analysis of Applications, Limitations, and Technical Solutions

Murari Kumar Singh[1] · Sanjeev Kumar Pippal[2] · Vishnu Sharma[3] · Ashish Kumar Chakraverti[4]

Received: 24 April 2025 / Accepted: 30 August 2025

Abstract
Blockchain technology (BT) offers a paradigm shift in health information management, alleviating key data protection and interoperability and empowering consumer concerns. Using cryptographic techniques and decentralized structural paradigms, blockchain provides a powerful solution to long-standing systemic inefficiencies in electronic health record (EHR) ecosystems, such as susceptibility to data breaches and poor control over patient-focused data information. Empirical case studies, including MedRec, MediLedger, and Estonia's national eHealth implementation, demonstrate blockchain's potential to revolutionize healthcare information governance by providing secure, regulated data access mechanisms while simultaneously reducing administrative overhead and ensuring compliance with stringent regulatory frameworks such as HIPAA (Health Insurance Portability and Accountability Act), GDPR (General Data Protection Regulation), and emerging data protection legislation. Applications of the technology's benefits go far beyond administrative efficiency, including areas of key importance such as pharmaceutical supply chain management, where the traceability embedded in blockchain can help address the risk of drug counterfeiting and create transparency. However, widespread blockchain adoption in healthcare confronts substantive implementation challenges, including scalability limitations, complex regulatory compliance requirements, and intricate integration with existing technological infrastructure. Emerging approaches, including permissioned blockchain models, smart contract implementations, and decentralized identity management frameworks, are being explored to mitigate these systemic limitations. While preliminary studies suggest increasing the use of blockchain for clinical applications in clinical trial management, patient consent processes, and insurance claims validation, this area remains in its infancy. Governmental and institutional society is actively investigating the combination of blockchain and other technologies, such as artificial intelligence and the Internet of Things, to improve predictive health analytics and real-time patient monitoring functionalities. Despite ongoing implementation issues, Blockchain technology (BT) shows great potential to change healthcare data management unprecedentedly, supporting increased security, operational effectiveness, and patient-centered information governance. Future research directions should focus on scalable optimization studies, standardizing protocols for international health data sharing, and broadly addressing the multifaceted ethical issues related to patient confidentiality and consent management in decentralized health information ecosystems.

Keywords Blockchain · Healthcare · EHR · EMR · PHR · Security

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SN Computer Science
A SPRINGER NATURE journal

Contribution to IEEE MPCON–2025

- ***Our respected HOD Sir, Dr. Sanjeev Kumar Pippal, made a remarkable contribution to the research paper titled "AI-Powered Deobfuscation: A Novel Approach to Understanding Reverse Engineered Code", which was presented at the prestigious IEEE MPCON–2025 Conference.***
- His involvement was instrumental in shaping the research, from conceptualizing core ideas to supporting the development of algorithms and refining the study for academic presentation. His intellectual inputs and technical expertise added immense value, ensuring the research stood out at an international level.

Mr. Kaleemur Rehman

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Mr. Kaleemur Rehman, Assistant Professor at G. L. Bajaj Institute of Technology and Management, successfully participated in a ***5-day Faculty Development Programme on "Generative AI."*** The programme was organized by the ***Department of Computer Science and Engineering in collaboration with Intel, held from 18th to 22nd August 2025*** at G. L. Bajaj Institute of Technology and Management, Uttar Pradesh. This FDP provided valuable knowledge on the applications and transformative potential of Generative AI, enriching faculty expertise in emerging domains of artificial intelligence and advanced technologies.

Cert. No.: ICT-4000/25 AI4FWCOACH220825153

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Participated in Faculty Development Programme
on
"GENERATIVE AI"
conducted by
Computer Science and Engineering Department

In Collaboration with Intel
from
18/08/2025 to 22/08/2025 (1 Week)

G.L.BAJAJ INSTITUTE OF TECHNOLOGY AND MANAGEMENT, UTTAR PRADESH

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Course Coordinator
NITTTR, Chandigarh

Shweta Khurana
Senior Director, Asia Pacific & Japan,
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International Government Affairs, Intel

Prof. (Dr.) B.R. Gurjar
Director
NITTTR, Chandigarh

Mr. Abhishek Singh

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Mr. Abhishek Singh, Assistant Professor at G. L. Bajaj Institute of Technology and Management, successfully participated in a ***5-day Faculty Development Programme on "Generative AI in collaboration with Intel."*** The programme was AICTE recognized which was organized ***by the Department of Computer Science, National Institute of Teachers Training and Research, Chandigarh, held from 18th August to 22nd August 2025.*** This FDP covered key concepts and applications of Generative AI, hands-on AI tools, and ethical considerations in AI deployment.

Certificate No: ICT-4008/25

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MINISTRY OF EDUCATION, GOVERNMENT OF INDIA

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UTTAR PRADESH**

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on

Generative AI in Collaboration with Intel

Conducted by

Computer Science and Engineering Department

from

18/08/2025 to 22/08/2025 (One Week)

at

G.L. Bajaj Institute of Technology and Management, Greater Noida, UP

Coordinator *Director*

Mr. Gurucharan Purte

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Mr. Gurucharan Purte, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar,*** attended a ***Faculty Development Programme on "Generative AI."*** The week-long programme, organized by the ***Department of Computer Science and Engineering*** in association with Intel, was held from ***18th to 22nd August 2025*** at ***G. L. Bajaj Institute of Technology and Management, Uttar Pradesh.*** The FDP highlighted the evolving landscape of Generative AI and its applications, providing participants with valuable knowledge and exposure to cutting-edge technologies.

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Government Partnerships & Initiatives
International Government Affairs, Intel

Prof. (Dr.) B.R. Gurjar
Director
NITTTR, Chandigarh

Mr. Horesh Kumar

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Mr. Horesh Kumar, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar,*** successfully took part in a ***one-week Faculty Development Programme on "Generative AI."*** The programme, conducted by the ***Department of Computer Science and Engineering*** in collaboration with ***Intel***, was held from ***18th to 22nd August 2025 at G. L. Bajaj Institute of Technology and Management, Uttar Pradesh.*** The FDP offered comprehensive insights into Generative AI, enhancing faculty competence in advanced artificial intelligence applications and research-oriented learning.

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Designing Error-Correcting and Combinatorial Cryptographic Solutions Using Discrete Mathematics

Mr. Horesh Kumar of the Department of CSE–AI has published impactful research in the field of secure distributed systems, showcasing an innovative blend of mathematics and cryptography. Key highlights include:

- Research Focus: ***Secure sharing of data in distributed systems using a novel combination of Error-Correcting Codes (ECCs) and combinatorial cryptographic algorithms.***
- Innovation: ***Development of stronger ECCs integrated with pliant combinatorial structures to ensure robust information integrity and confidentiality in adversarial environments.***
- ***Mathematical Foundations:***
  - Finite fields
  - Combinatorial block designs
  - Graph-theoretic models
- ***Experimental Results:***
  - 20% improvement in ECC error correction.
  - 15% reduction in cryptographic overhead.
  - Maintains scalability and fault tolerance.
- Applications: ***Secure and efficient communication in IoT systems, cloud networks, and adversarial environments requiring high reliability.***
- Through this research, the department reinforces its vision of driving innovation, ensuring safety, and delivering impactful real-world solutions.

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Designing error-correcting and combinatorial cryptographic solutions using discrete mathematics

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Abstract

In this paper, we introduce an innovative method of secure sharing of data in distributed systems, which is based on the combination of Error-Correcting Codes (ECCs)

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and combinatorial cryptographic algorithms, rooted in the realms of Discrete Mathematics. The desired solution utilizes finite fields, combinatorial block designs, and graph-theoretic models to overcome critical obstacles to robust information integrity and confidentiality in adversarial communication environments. Our construction yields stronger ECCs for reliable identification based on pliant combinatorial structures. We provide experimental results showing up to a 20% increase in ECC error correction and 15% reduction in cryptographic overhead, while maintaining the scalability and fault-tolerance. This integrated approach results in a secure, efficient, and mathematically sound communication scheme for distributed systems, and can be applied not only in IoT, cloud networks, but also in secure data transmission in adversarial environments.

Subject Classification: *94A60.*

Keywords: *Error-correcting codes, Combinatorial cryptography, Discrete mathematics, Cryptographic key design, Combinatorial algorithms, Security protocols.*

1. Introduction

In the networked world, distributed systems have become indispensable that facilitate sharing, communication, computing, and storage. Such systems, including cloud-based platforms, IoT networks and edge devices, typically run in settings where data may be compromised, intercepted or subject to attacks. These systems require data to be secured in a trusted and confidential manner. Due to its origin in discrete mathematics, error-correcting codes (ECCs) present a strong means to decide on errors to be detected and corrected in the process of communication. However, classical ECCs must be improved to satisfy the growing scalability and performance requirements of modern distributed systems. The growing use of distributed systems in sensitive areas like healthcare, autonomous driving, or financial transactions requires cryptographic primitives not only protecting information but also considering the management of cryptographic keys in a resource-efficient way. Combinatorial cryptography based on discrete structures such as block design and graph theory is a natural source of promising candidate for designing rigorous key management systems. Combining ECCs and combinatorial cryptography can lead to the building of secure protocols, guaranteeing data integrity and confidentiality.

In this work, we introduce a discrete mathematics-managed model which combines improved ECCs and combinatorial based encryption techniques. The approach is worthy of investigation especially for overhead sensitive or highly demanded scenarios, i.e. secure multicast of military communication, fault-tolerant data dissemination in disaster recovery

Mr. Mayank Kr. Mongia

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Mr. Mayank Kumar Mongia, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar,*** attended a ***five-day Faculty Development Programme on "Generative AI."*** The programme, organized by the ***Department of Computer Science and Engineering*** in partnership with ***Intel***, was conducted from ***18th to 22nd August 2025 at G. L. Bajaj Institute of Technology and Management, Uttar Pradesh.*** The FDP offered in-depth knowledge on Generative AI technologies and their applications, helping faculty enhance their understanding and skills in this rapidly evolving field of artificial intelligence.

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Prof. (Dr.) B.R. Gurjar, Director, NITTTR, Chandigarh

Dr. Mubashshir Uddin Khairoowala
Assistant Professor, GLBITM

An Iterative Algorithm for Split Variational Inclusion, a System of Variational Inequalities, and Fixed Point Problems

D***r. Mubashshir Uddin Khairoowala of the Department of CSE–AI has contributed to advanced mathematical research, presenting a novel iterative algorithm with strong theoretical and practical implications.*** Key highlights include:

- ***Research Objective: To identify a common solution for: Innovation:***
  - A split variational inclusion problem
  - A system of variational inequalities
  - A common fixed point set of a countable family of nonexpansive mappings
- ***Framework: Developed in the setting of real Hilbert spaces, ensuring rigor and generality.***
- ***Core Achievement:***
  - Proposed algorithm converges strongly to a common solution under suitable parameter conditions.
  - Extends and unifies several existing results in this domain.
- ***Validation:***
  - Includes a numerical example demonstrating the effectiveness of the algorithm.
  - Provides a comparative analysis against two existing methods, proving superior performance.
- This research Advances the department's contribution to applied mathematics and optimization techniques, with potential applications in computational science and engineering.

The Journal of Analysis
https://doi.org/10.1007/s41478-025-00959-w

ORIGINAL RESEARCH PAPER

An iterative algorithm for split variational inclusion, a system of variational inequalities and fixed point problems

Mubashshir U. Khairoowala[1] · Shamshad Husain[2] · Mohd Furkan[3]

Received: 3 February 2025 / Accepted: 31 July 2025

Abstract
The primary goal of this paper is to find a common solution of a split variational inclusion problem, a system of variational inequalities problem and common fixed point set of a countable family of nonexpansive mappings in the framework of real Hilbert spaces. Under some suitable conditions imposed on the sequences of parameters, we prove that the sequence induced by the proposed iterative method converges strongly to a common solution of the above stated problems. We derive a consequence from the main convergence result. Further, a numerical example is also provided to demonstrate the efficacy of the proposed iterative method. Finally, a comparison has also been carried out of our algorithm with two existing methods. The technique and conclusions discussed in this paper extend and unify previously published researches in this topic.

Keywords Split variational inclusion problem · System of variational inequalities · Fixed point problem · Iterative algorithm

Mathematics Subject Classification 47H05 · 47H10 · 47J22 · 47J25

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Published online: 24 September 2025

Springer

Mr. Suresh Kumar

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** From ***18th to 22nd August 2025,*** Mr. Suresh Kumar, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar,*** took part in a ***Faculty Development Programme on "Generative AI."*** Organized by the ***Department of Computer Science and Engineering*** in collaboration with **Intel,** the programme offered an immersive learning experience covering both theoretical foundations and practical applications of Generative AI. Through interactive sessions and hands-on exercises, participants enhanced their understanding of AI technologies and their integration into teaching, research, and real-world problem-solving.

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Participated in the AICTE Recognized Faculty Development Programme

on

Generative AI in Collaboration with Intel

Conducted by

Computer Science and Engineering Department

from

18/08/2025 to 22/08/2025 (One Week)

at

G.L. Bajaj Institute of Technology and Management, Greater Noida, UP

Coordinator *Director*

Visible Light Communication and Quadrant Photodiode-Based Vehicle Positioning for Enhanced Road Safety

Mr. Suresh Kumar from the Department of CSE–AI has contributed to cutting-edge research in the domain of intelligent transportation and vehicular safety systems. The published paper highlights:

- Development of a ***Visible Light Communication (VLC)-enabled safety framework*** for autonomous and connected vehicles.
- Integration of ***Visible Light Positioning (VLP) with Angle-of-Arrival (AoA) estimation to improve vehicle-to-vehicle (V2V) communication*** and spatial awareness.
- ***Technology Used:***

  1. Existing LED headlights and taillights utilized for both illumination and optical communication

  2. Photodiode-based receivers to detect modulated light signals and extract angular displacement.

- ***Methodology:***

  1. Triangulation of object locations using geometric baselines.

  2. Accurate estimation of inter-vehicle distance and relative positions.

- Impact: ***Provides a low-latency, GPS-independent solution for positioning and situational awareness. Particularly effective in tunnels, parking structures, and dense urban traffic.***
- This pioneering research strengthens the department's commitment to innovation, safety, and real-world applications of AI and communication technologies.

DE GRUYTER J. Opt. Commun. 2025; aop

Aparna Tiwari*, Seema Kedar, Suresh Kumar and Bharati Shukla

Visible light communication and quadrant photodiode based vehicle positioning for enhanced road safety

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Abstract: The increasing demand for advanced safety features in autonomous and connected vehicles has spurred significant research into vehicle-to-vehicle (V2V) communication systems. This paper presents a novel VLC-enabled vehicular safety framework that integrates visible light positioning (VLP) with angle-of-arrival (AoA) estimation to enhance spatial awareness and intervehicle distance tracking. The proposed system leverages existing vehicular lighting infrastructure, such as LED headlights and taillights, not only for illumination but also as a medium for optical communication and spatial localization. Photodiode-based receivers detect modulated light signals and extract angular information to estimate the relative positions of nearby vehicles. By analyzing angular displacement and using known geometric baselines between sensors, the system triangulates object locations and determines vehicle separation with high accuracy. Further analysis using time-to-collision (TTC) metrics demonstrated the strong impact of vehicle separation and relative speed on collision risk. For example, a separation of 5.51 *m* corresponds to a TTC of 2.75 s at a relative speed of 2 m/s, but this decreases sharply to 1.10 s at a relative speed of 5 m/s, underscoring how higher speeds significantly reduce available reaction time for drivers or automated systems. This approach provides a low-latency, GPS-independent solution for position estimation and situational awareness, particularly effective in constrained environments such as tunnels, underground parking structures, and dense urban areas.

Keywords: VLC; V2V; VLP; AoA

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1 Introduction

Ensuring safety and operational reliability in autonomous and advanced driver-assistance systems (ADAS) is among the foremost challenges in the development of intelligent transportation systems [1]. Traditional vehicular sensing technologies such as LiDAR, radar, and ultrasonic sensors have played a pivotal role in enabling perception, navigation, and obstacle detection [2, 3]. However, these sensors can face performance degradation under adverse weather conditions, electromagnetic interference, or GPS-denied environments, which can compromise the effectiveness of critical functions such as intervehicle communication, localization, and collision risk assessment.

To address these limitations, recent research has focused on integrating Visible Light Communication (VLC) into vehicular environments [4]. VLC leverages existing LED-based vehicle lighting systems such as headlights, brake lights, and turn indicators for dual functionality: illumination and high-speed, short-range data transmission [5]. Unlike conventional radio frequency (RF) technologies, VLC operates in the visible light spectrum, providing several key advantages, including immunity to electromagnetic interference, enhanced data security due to directional transmission, and compatibility with existing vehicular lighting infrastructure [6].

The structured nature of traffic environments makes VLC particularly suitable for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications. In addition to enabling reliable data exchange, VLC systems can also support visible light positioning (VLP) by analyzing received light characteristics such as intensity, modulation patterns, and angle-of-arrival (AoA). These positioning techniques allow vehicles to estimate relative distances and angular positions of neighboring vehicles or infrastructure nodes with high spatial accuracy.

In this paper, we propose a VLC-enabled vehicular safety system that integrates VLP and AoA-based localization for real-time intervehicle distance estimation and spatial awareness. The system utilizes photodetector-based receivers to decode modulated light signals transmitted by LED sources on surrounding vehicles. By analyzing the angular

Dr. Nair Ul Islam

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Dr. Nair Ul Islam, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar***, took part in a *week-long Faculty Development Programme on "Generative AI."* The programme was organized by the ***Department of Computer Science and Engineering*** in association with ***Intel***, and was held from ***18th to 22nd August 2025*** at G. L. Bajaj Institute of Technology and Management, Uttar Pradesh. The FDP focused on emerging trends and practical applications of Generative AI, enabling faculty to enhance their expertise in this rapidly advancing field of artificial intelligence.

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International Government Affairs, Intel

Prof. (Dr.) B.R. Gurjar
Director
NITTTR, Chandigarh

Ms. Bhumika Nirmohi

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Ms. Bhumika Nirmohi, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar,*** successfully participated in a ***week-long Faculty Development Programme on "Generative AI"*** held from ***18th to 22nd August 2025.*** Organized by the ***Department of Computer Science and Engineering*** in collaboration with ***Intel***, the programme provided comprehensive exposure to both the theoretical and practical aspects of Generative AI. Participants explored advanced AI techniques and their applications, gaining valuable insights to enhance teaching, research, and innovation in the field of artificial intelligence.

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at

G.L. Bajaj Institute of Technology and Management, Greater Noida, UP

Coordinator *Director*

Dr. Avadhesh Kumar Sharma

Assistant Professor, GLBITM

- **NITTTR Organizer/Local Coordinator:** ***Successfully organized a One-Week Faculty Development Programme on Generative AI in Collaboration with Intel conducted by the National Institute of Technical Teachers Training & Research (NITTTR), Chandigarh, from 18th August to 22nd August 2025.*** Serving as ***the Local Coordinator***, he played a key role in facilitating the FDP at G.L. Bajaj Institute of Technology & Management, ensuring seamless execution and active participation of faculty members.

राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान
National Institute of Technical Teachers Training & Research
शिक्षा मंत्रालय, भारत सरकार / Ministry of Education, Government of India
सेक्टर – 26, चण्डीगढ़ - 160 019 / Sector - 26, Chandigarh - 160 019

NITTTR/2025-2026/ICT-45 Dated: 22/08/2025

CERTIFICATE OF APPRECIATION

This certificate is awarded to **AVADHESH KUMAR SHARMA** for acting as Center/Local Coordinator of the remote center **"GL BAJAJ INSTITUTE OF TECHNOLOGY AND MANAGEMENT"** and providing valuable contribution and support during conduct of One Week Faculty Development Programme on **"Generative AI in Collaboration with Intel"** from **18/08/2025 to 22/08/2025** conducted by Computer Science and Engineering Department, NITTTR Chandigarh through ICT Mode.

We appreciate his sincere effort towards smooth conduct of above training program.

We wish him/her all the best for his endeavor.

Course Coordinator
NITTTR, Chandigarh

- ***Faculty Development Programme Participation:*** Successfully participated in a ***5-day Faculty Development Programme on "Generative AI in collaboration with Intel."*** The programme was AICTE recognized which was organized ***by the Department of Computer Science, National Institute of Teachers Training and Research, Chandigarh, held from 18th August to 22nd August 2025.*** This FDP covered key concepts and applications of Generative AI, hands-on AI tools, and ethical considerations in AI deployment.

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Prof. (Dr.) B.R. Gurjar
Director
NITTTR, Chandigarh

Dr. Himanshu Nandanwar

Assistant Professor, GLBITM

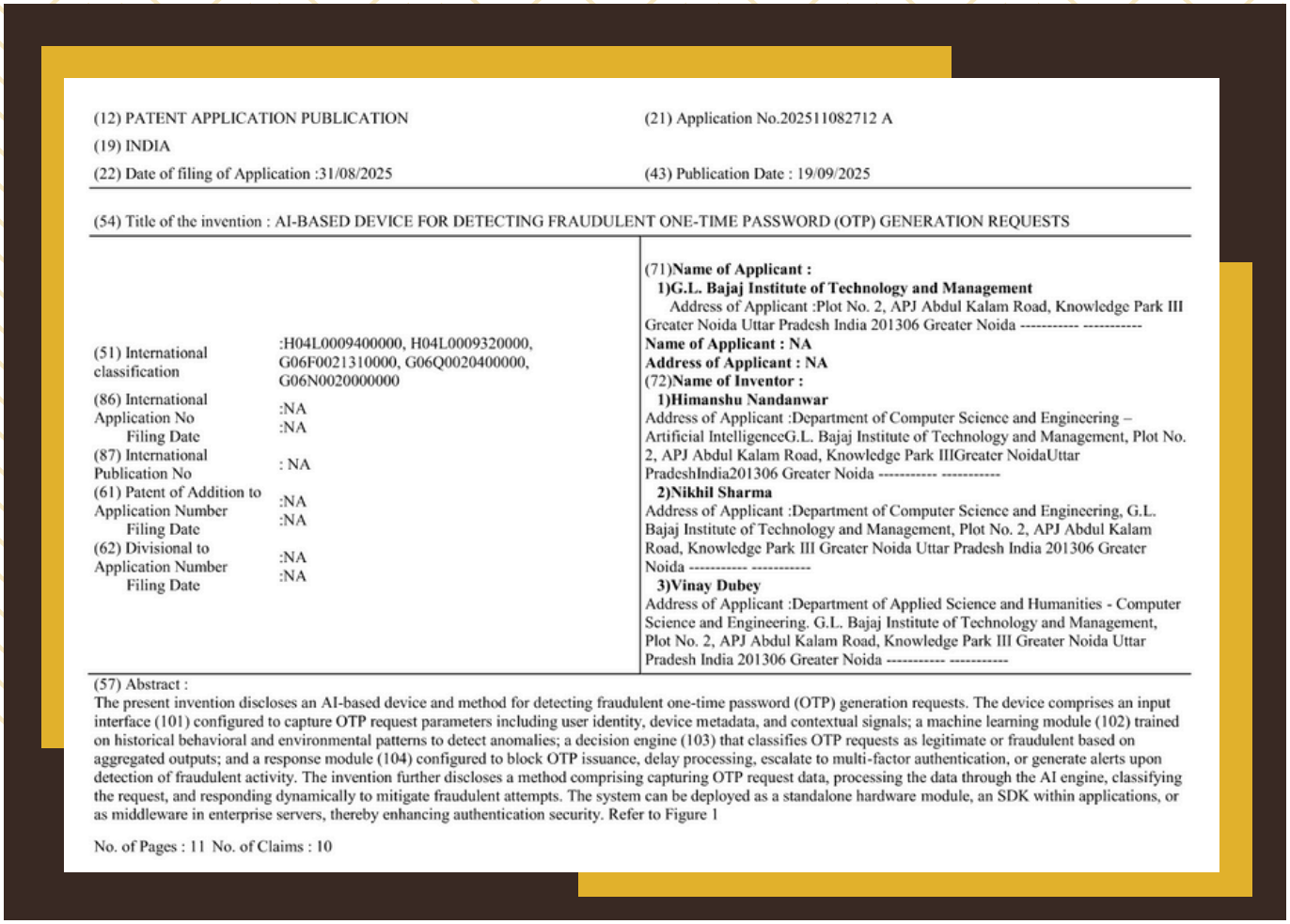
RESEARCH EXCELLENCE AWARD:

- ***Dr. Himanshu Nandanwar,*** faculty member of the Department of CSE–AI, has been ***honored with the 8th Research Excellence and Innovation Award under the Commendable Research Award category*** by Delhi Technological University on 19th September 2025. He received the award from ***Prof. Prateek Sharma, Hon'ble Vice Chancellor, DTU, and was felicitated by Prof. Abhay Karandikar, Secretary, DST,*** Government of India, in recognition of his excellence in research.
- This ***recognition was awarded for his outstanding contribution in publishing two SCI-indexed research papers,*** further solidifying his impact in the academic and research community. Along with the award, ***he also received a cash prize of ₹1,00,000.***

Captured Memories

PATENT PUBLICATION:

- We are delighted to share that D***r. Himanshu Nandanwar***, faculty member of the Department of CSE–AI, ***has successfully published a patent titled: "AI-Based Device for Detecting Fraudulent One-Time Password (OTP) Generation Requests"*** (Application No. 202511082712 A, ***Publication Date: 19th September 2025.***
- This innovation introduces an AI-driven device and method for enhancing authentication security by detecting fraudulent OTP generation attempts.
- ***Key Aspects includes:***
  - Captures OTP request parameters such as user identity, device metadata, and contextual signals.
  - Classifies OTP requests as legitimate or fraudulent.
  - Dynamically blocks OTP issuance, triggers multi-factor authentication, or escalates alerts.



(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :31/08/2025

(21) Application No.202511082712 A
(43) Publication Date : 19/09/2025

(54) Title of the invention : AI-BASED DEVICE FOR DETECTING FRAUDULENT ONE-TIME PASSWORD (OTP) GENERATION REQUESTS

(51) International classification	:H04L0009400000, H04L0009320000, G06F0021310000, G06Q0020400000, G06N0020000000
(86) International Application No Filing Date	:NA :NA
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

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(57) Abstract :
The present invention discloses an AI-based device and method for detecting fraudulent one-time password (OTP) generation requests. The device comprises an input interface (101) configured to capture OTP request parameters including user identity, device metadata, and contextual signals; a machine learning module (102) trained on historical behavioral and environmental patterns to detect anomalies; a decision engine (103) that classifies OTP requests as legitimate or fraudulent based on aggregated outputs; and a response module (104) configured to block OTP issuance, delay processing, escalate to multi-factor authentication, or generate alerts upon detection of fraudulent activity. The invention further discloses a method comprising capturing OTP request data, processing the data through the AI engine, classifying the request, and responding dynamically to mitigate fraudulent attempts. The system can be deployed as a standalone hardware module, an SDK within applications, or as middleware in enterprise servers, thereby enhancing authentication security. Refer to Figure 1

No. of Pages : 11 No. of Claims : 10

Mr. Rudra Kumar Sinha

Assistant Professor, GLBITM

- ***Faculty Development Programme Participation:*** Mr. Rudra Kumar Sinha, Assistant Professor at ***G. L. Bajaj Institute of Technology and Management, Gautam Budh Nagar,*** participated in a five-day ***Faculty Development Programme on "Generative AI."*** Organized by the ***Department of Computer Science and Engineering*** in partnership with ***Intel*** from ***18th to 22nd August 2025,*** the programme introduced participants to cutting-edge Generative AI concepts and practical applications. The sessions enhanced faculty knowledge in advanced AI technologies, preparing them to leverage these innovations in academic and research settings.

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A Sincere Thank You from The CSE-AI Department Newsletter Team!

The AI Department Newsletter Team extends heartfelt gratitude for the generous support that made this edition possible. We are especially thankful to the Department of CSE-AI for providing us with a platform to showcase the pioneering achievements and initiatives in the field of artificial intelligence.

We express our sincere appreciation to our respected Director, HOD, and faculty members whose constant guidance and encouragement have been instrumental in shaping this newsletter into a meaningful reflection of our department's progress.

We also wish to acknowledge the unwavering support of the Vividhata Club. Your commitment to fostering student growth continues to inspire us, and we are confident that this newsletter serves as a valuable avenue for students to explore their technical and creative potential.

Warm regards,
Editorial Team
Department of CSE-AI