

DECEMBER
2025

THE NEWSLETTER

DEPARTMENT OF CSE

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About: The legacy behind Excellence

GL Bajaj Institute of Technology and Management: A Premier Institution in North India

GL Bajaj Institute of Technology and Management, Greater Noida, is one of the leading self-financed educational institutions in the Delhi-NCR region. Established under the esteemed Rajeev Memorial Academic Welfare Society (Registered under the Societies Registration Act, 1860), the institute is approved by the All India Council for Technical Education (AICTE), Ministry of Education, Government of India, and is affiliated with Dr. A.P.J. Abdul Kalam Technical University (AKTU), Lucknow.

GL Bajaj stands out not only for its academic rigor but also for its commitment to nurturing well-rounded individuals equipped with the skills and values required for a successful future. The institute consistently maintains one of the highest pass percentages among engineering and management colleges affiliated with AKTU in the Noida and Greater Noida region.

Over the past eight years, GL Bajaj has secured a distinguished position in AKTU university results and is widely recognized among the top institutions in North India.





Institutional & Departmental Ethos

Vision of the Institute

To be an institute of repute, providing globally competent and socially sensitive professionals

Mission of the Institute

- To equip with the latest technologies to be globally competitive professionals.
- To inculcate qualities of leadership, professionalism, corporate understanding and executive competence.
- To imbibe and enhance human values, ethics and morals in our students.

Department Vision

M1 : Developing a strong mathematical & computing skill set among the students.

M2 : Extending the role of computer science and engineering in diverse areas like Internet of Things (IoT), Artificial Intelligence & Machine Learning and Data Analytics.

M3 : Imbibing the students with a deep understanding of professional ethics and high integrity to serve the Nation.

M4 : Providing an environment to the students for their growth both as individuals and as globally competent Computer Science professionals with encouragement for innovation & start-up culture.

Program Educational Objectives (PEOs)

PEO 1 : Graduate will work in the area of Application Software Development, Artificial Intelligence & Machine Learning, Data Analytics, and Internet of Things.

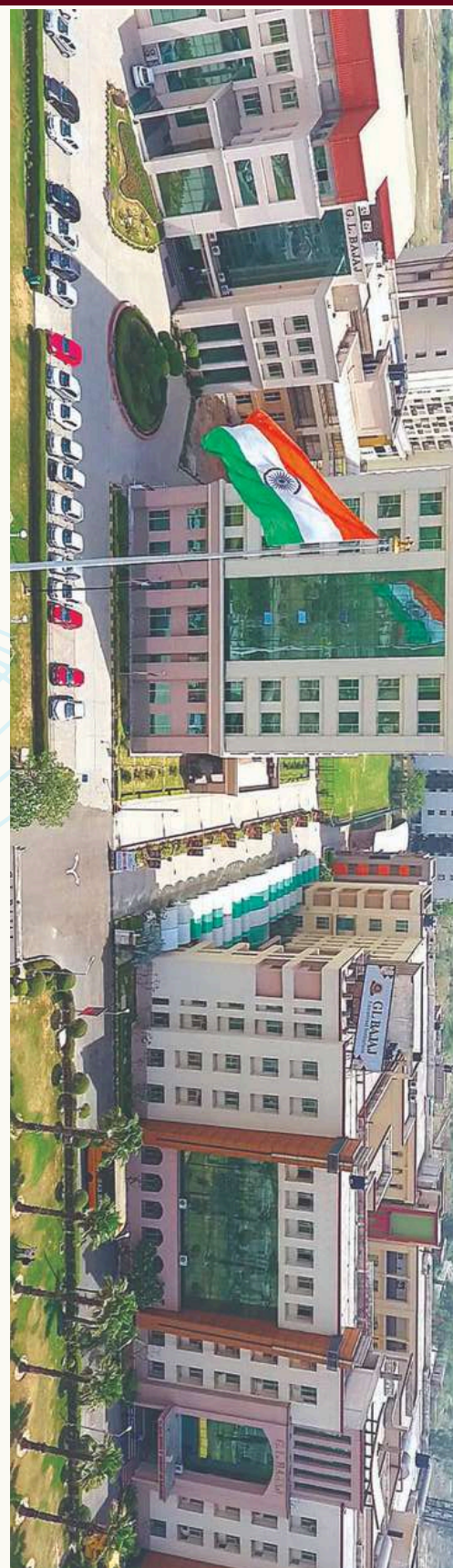
PEO 2 : Graduates will become successful software professionals with leadership and managerial quality in the modern software industry based on their strong skills on theoretical and practical foundation.

PEO 3 : Graduate will exhibit professional ethics and moral value with capability of working as an individual and as a team to contribute towards the need of industry and society

Program Specific Outcomes (PSOs)

PSO1 : Students will be able to use problem solving skills to develop efficient algorithmic solutions.

PSO2 : Students will be able to develop solutions for a given problem in the area of artificial intelligence, data analytics, Computer Vision and IOT through a conducive environment and infrastructure.





Visionary Voice



Dr. Preeti Bajaj
Director, GLBITM

*“The goal of education
is the advancement of
knowledge and the
dissemination of
truth.”*



Message from the Director

Dear Students, Faculty, and Well-Wishers,
Welcome to GL Bajaj Institute of Technology and Management – where academic excellence meets holistic development. We are committed to shaping future technocrats and leaders through quality education, character building, and innovative thinking.

With state-of-the-art infrastructure, dedicated faculty, and a focus on both curriculum and co-curricular activities, GL Bajaj provides an ideal environment for learning and growth. Our efforts are geared toward creating professionals who are confident, competent, and ready for the global stage.

We continually evolve with emerging trends in technology and education, ensuring our students remain ahead of the curve. Regular seminars, workshops, and faculty development programs help us maintain a dynamic academic ecosystem.

Join us in our journey toward knowledge, innovation, and excellence.

Warm regards,

Dr. Preeti Bajaj
Director, GLBITM



From the HOD's Desk Computer Science

Warm greetings to all of you!

It gives me immense pleasure to present this edition of the Department of Computer Science & Engineering's newsletter. This platform not only celebrates the accomplishments of our department but also serves as a bridge that connects us all—students, faculty, alumni, and stakeholders—with a shared sense of pride and progress.

In today's fast-paced, technology-driven world, where the boundaries between nations and disciplines are dissolving rapidly, it becomes essential to stay ahead with knowledge, skill, and adaptability. With globalization and competition shaping our future, our department strives to keep pace with emerging trends in technology, science, and education.

Let us continue this journey together with curiosity in our minds and courage in our hearts.

Warm regards,

Dr. Sansar Singh Chauhan
Head of the Department
Computer Science & Engineering



**Dr. Sansar Singh
Chauhan**
**Head of the
Department
Computer Science &
Engineering**

*“It's all about the
mindset and hard
work you put in.”*





Editorial Crew

Message from the Editorial Board Coordinator

It gives me immense pleasure to present the monthly Edition of the much-awaited CSE Department Newsletter. This newsletter serves as a platform to highlight the academic achievements, innovative initiatives, research contributions, and vibrant activities of our department.

With each edition, we aim to capture the spirit of progress and showcase the dedication of our faculty, students, and staff.



I extend my sincere gratitude to all contributors, editors, and coordinators who have worked diligently to bring this newsletter to life. I also encourage students and faculty to actively participate in future editions by sharing their achievements, ideas, and creative inputs.

Together, let us continue to build a culture of learning, innovation, and excellence.

Mr. Shikhar Pandey
Editorial Board Coordinator
Department of Computer Science & Engineering
GL Bajaj Institute of Technology and Management



Editorial Crew



SHUBHANJALI



PRIYA GOEL



NAINSI MOTIYAN



REHAN SHAMIM



MAHEK SINGHAL



SHRUTI DIXIT



VAIBHAV



Student Achievement

Placement Highlight->



Disha Goel and **Amit Kumar Singh**, students of B.Tech (Computer Science & Engineering), Batch 2026 from GL Bajaj Institute of Technology and Management (GLBITM), have successfully secured placements at Nucleus Software through the campus recruitment drive.

Reflecting on their achievement, they shared:

“What we achieved today started in the classrooms of GL Bajaj. Every lesson, every mentor, and every bit of support shaped our journey and built our confidence. This placement is as much GL Bajaj’s success as it is ours, and we are genuinely grateful.”

GL Bajaj congratulates Disha Goel and Amit Kumar Singh on their remarkable success and wishes them a bright future ahead.



Student Achievement

Placement Highlight->



Sarvagya Krishna, a student of B.Tech (Computer Science & Engineering), Batch 2026 from GL Bajaj Institute of Technology & Management (GLBITM), has successfully secured a placement at Edoofa through the campus recruitment drive.

Sharing his thoughts on this achievement, he said:

“My growth from a student to a professional was made possible by GL Bajaj’s continuous support. The knowledge, discipline, and motivation I received became the backbone of my success. Forever grateful for this journey.”

GL Bajaj congratulates Sarvagya Krishna and wishes him continued success in his future endeavors.



Student Achievement

Placement Highlight->



Devendar Singh Rawat (CSE), B.Tech Batch 2026 from GL Bajaj Institute of Technology & Management (GLBITM) has successfully secured a placement at Prosperr.IO through the campus recruitment drive.

He expressed gratitude towards GL Bajaj for the constant support and guidance, stating that the institute's structured training programs, industry-oriented learning, and continuous mentorship played a crucial role in building his confidence and preparing him for this achievement.

GL Bajaj congratulates Devendar Singh Rawat on his success and wishes him a bright and prosperous future ahead.



Student Achievement

CSE Scholar Shines at International Conferences->

Research Highlights->

Defense Innovation (ICSIDS-2025): Abhishek presented his research titled "A Lightweight and Illumination-Adaptive Deep Learning Model to Enhance the Situation Awareness in Challenging Defence Environments" under the guidance of **Dr Nitin Sir and Dr pushpa Ma'am**. This paper was featured at the International Conference on Sustainable Developments in Computer Engineering, Green Technology & Smart Systems (ICSIDS-2025).



Certificate Highlights->

IEEE Certificate (MEDCOM-2025): Awarded for his presentation in a forum organized by the Department of Electronics & Communication Engineering at GLBITM, Greater Noida. "Abhishek's commitment to developing **lightweight, efficient deep learning models** reflects the department's vision of creating globally competent professionals who serve the needs of industry and society".





Student Achievement

Research Highlights->



Nighttime Surveillance (MEDCOM-2025): Anurag contributed a paper titled "**Enhancing Visual Perception in Darkness: A Lightweight Attention-Based Model for Nighttime Surveillance**" under the guidance of **Dr Jeba Ma'am** and **Dr Arun Sir** at the Three-Day IEEE International Conference on Modern Electronics Devices and Intelligent Communication System (MEDCOM-2025). This conference was technically co-sponsored by the IEEE-Computational Intelligence Society.



Faculty Recognition

HOD, CSE Participates - "Apple in Education Awareness Program" at AKTU->

The Department of Computer Science & Engineering, G.L. Bajaj Institute of Technology and Management, proudly shares that **Dr. Sansar Singh Chauhan, Head of the Department (CSE)**, participated in the "Apple in Education Awareness Program" organized by the Innovation Hub, Dr. A.P.J. Abdul Kalam Technical University (AKTU), Lucknow, in collaboration with **Aegis Infotech and Apple Premium Education Partner at UPID.**



Dr. Chauhan's participation followed an official invitation issued by **Prof. Jai Prakash Pandey, Hon'ble Vice-Chancellor, AKTU**, to principals and academic leaders of affiliated institutions. The program was conducted on 20 December 2025 at the UPID Noida Campus.

Dr. Sansar Singh Chauhan was awarded a Certificate of Appreciation for his active participation. Such engagements reflect the department's commitment to adopting emerging technologies, strengthening curriculum relevance, and promoting globally aligned technical education for students.



Faculty Recognition

Academic Excellence and Global Scholarly Contribution by Dr. Pankaj Kumar

The Department of Computer Science and Engineering proudly acknowledges the academic and professional achievements of **Dr. Pankaj Kumar**, whose active participation in **international conferences and scholarly review processes reflects his dedication to research excellence**. He served as a Reviewer for the International Conference on Digital Innovation for Sustainable Solutions (ICDISS-2025), International Conference on Emerging Technologies & Innovation for Sustainability as well as in the International Conference on Advanced Computing & Emerging Technologies. He has also contributed a paper in MEDCOM 2025 entitled "Sustainable Waste Management in Smart Cities using IoT and AI: Minimization, Reuse, Recycling and Re-manufacturing".





Faculty Recognition

Global Scholarly Contribution as a Reviewer by Dr. Pankaj Kumar

The Department of Computer Science and Engineering proudly acknowledges **Dr. Pankaj Kumar**, whose **active participation as a reviewer in MEDCOM-2025, International Conference on AI and Quantum Computation Based Sensor Applications, International conference on Computing, Communications and Automation** as well as for their significant contribution in **2 manuscripts for Scientific reports in SPRINGER NATURE** reflects their commitment towards growth and scientific pursuits in this modern, technologically advanced world.





Faculty Recognition

Scholarly Contribution as a Session Chair by Dr. Praveen Kumar Rai->



We are proud to share that **Dr. Praveen Kumar Rai** was honored with a Certificate of Appreciation for serving as a Session Chair at the 2nd International Conference on Next-Generation Communication and Computing (NGCCOM-2025), held on 18–19 December 2025 at GL Bajaj Institute of Technology & Management, Greater Noida.

The conference, supported by Springer, brought together researchers, academicians, and industry experts to discuss emerging trends in communication and computing technologies. Dr. Rai's contribution as a Session Chair reflects his commitment to academic excellence and research leadership.

We congratulate him on this achievement and wish him continued success in his academic journey.



Faculty Recognition

Scholarly Contribution as Session Chair by Mr. Shikhar Prateek Pandey->

The Department of Computer Science and Engineering extends its heartfelt congratulations to **Mr. Shikhar Prateek Pandey** as a **session chair** at the **International Conference on Artificial Intelligence and Sustainable Computing for Smart Cities (AIS2C2: 2025)**, organized by Gautam Buddha University, Greater Noida, from 24th–25th December 2025.



This achievement reflects his academic competence, leadership, and active contribution to the research community. It also highlights his ability to engage with emerging research domains and contribute meaningfully to scholarly discussions at an international forum. The department acknowledges his efforts in upholding academic excellence and bringing recognition to the institution through his participation and responsibility in such a prestigious conference.



Faculty Recognition

Scholarly Contribution as a Reviewer by Mr. Shikhar Prateek Pandey->

The Department of Computer Science & Engineering extends its sincere congratulations to **Mr Shikhar Prateek pandey** for being reviewer at the **International Conference on Computational Intelligence and Informatics (ICACII : 2025)**, organized by Anurag University.



This accomplishment reflects his strong subject expertise, critical evaluation skills, and commitment to maintaining academic and research quality.

His role as a reviewer demonstrates professional maturity and the trust placed in him by the academic community.

The department appreciates his efforts in upholding scholarly rigor and proudly acknowledges his role in representing the institution through such responsible academic engagement.



Patent Publication

Smart Expiry Prediction and Consumption Prioritization System->

PATENT APPLICATION PUBLICATION
INDIA

(21) Application No.202511099089 A

Date of filing of Application :14/10/2025

(43) Publication Date : 05/12/2025

Title of the invention : SMART EXPIRY PREDICTION AND CONSUMPTION PRIORITIZATION SYSTEM

International classification	:G06N0003006000, G06N0003126000, G05B0013040000, F25D0029000000, G06Q0030020100	(71)Name of Applicant : 1)G.L. Bajaj Institute of Technology and Management Address of Applicant :Plot No. 2, APJ Abdul Kalam Road, Knowledge Park : Greater Noida Uttar Pradesh India Greater Noida Uttar Pradesh India
Priority Document No	:NA	(72)Name of Inventor :
Priority Date	:NA	1)Shikhar Pandey
Name of priority country	:NA	2)Sansar Singh Chauhan
International Application No	:	3)Payal Garg
Filing Date	:01/01/1900	4)Arun Kumar
International Publication No	: NA	5)Vrinda Sachdeva
Patent of Addition to Application Number	:NA	6)Supriya Kapoor
Filing Date	:NA	
Divisional to Application Number	:NA	
Filing Date	:NA	

Abstract :

invention discloses a Smart Expiry Prediction and Consumption Prioritization System (100) designed to minimize food waste through intelligent spoilage prediction and consumption guidance. The system comprises a storage unit (101) equipped with environmental sensors (102) for monitoring temperature, humidity, and opening frequency. A data acquisition module (103) collects and transmits data to a preprocessing module (104), which cleans and structures it for analysis. An iterative feature selection module (105) using Genetic Algorithms (GA) and Particle Swarm Optimization (PSO) identifies key spoilage factors, while an advanced data handling module (106) employing SMOTE balances the dataset. A predictive model (107) estimates expiry likelihood, and a recommendation module (108) prioritizes items for consumption. A user interface (109) provides real-time alerts and suggestions via a mobile or web app. The system adaptively learns from spoilage data, ensuring high accuracy, reduced waste, and improved household or commercial food management.

of Pages : 12 No. of Claims : 10

The Department of Computer Science and Engineering is proud to announce the publication of a patent titled “**Smart Expiry Prediction and Consumption Prioritization System**”, reflecting the department’s continued commitment to innovation, research excellence, and socially relevant technological solutions.

The patent application (**Application No. 202511099089 A**) was officially published on 05 December 2025 by the Indian Patent Office. The invention has been filed by G.L. Bajaj Institute of Technology and Management, Greater Noida, with faculty members and researchers from the CSE department as inventors.

The proposed framework employs Genetic Algorithms (GA) and Particle Swarm Optimization (PSO) to analyze spoilage patterns, handle imbalanced datasets, and accurately estimate expiry likelihood.

Inventors:

Sansar Singh Chauhan

Shikhar Pandey

Payal Garg

Arun Kumar

Vrinda Sachdeva

Supriya Kapoor

The department congratulates the entire team for this significant achievement and applauds their contribution toward research, innovation, and societal impact.



Patent Publication

Computing Device->

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202511099056 A

(19) INDIA

(22) Date of filing of Application :14/10/2025

(43) Publication Date : 12/12/2025

(54) Title of the invention : COMPUTING DEVICE

(51) International classification	:G06F0001160000, F16M0011400000, G06V0020560000, A61G0005100000, F16M0011380000	(71)Name of Applicant : 1)G.L. Bajaj Institute of Technology and Management Address of Applicant :Plot No. 2, APJ Abdul Kalam Road, Knowledge Park III Greater Noida Uttar Pradesh India Greater Noida Uttar Pradesh India
(31) Priority Document No	:NA	(72)Name of Inventor :
(32) Priority Date	:NA	1)Dr. Vrinda Sachdeva
(33) Name of priority country	:NA	2)Dr. Neeru Singh
(86) International Application No	:	3)Dr. Rupa Rani Sharma
Filing Date	:01/01/1900	4)Dr. Paramjeet Kaur
(87) International Publication No	: NA	5)Dr. Arun Kumar
(61) Patent of Addition to Application Number	:NA	6)Shikhar Prateek Pandey
Filing Date	:NA	7)Ms. Supriya
(62) Divisional to Application Number	:NA	
Filing Date	:NA	

(57) Abstract :

The invention discloses a computing device (100) incorporating an elevatable and rotatable display module (110) to enhance ergonomics and usability. The computing device (100) includes an elevation assembly (120) that enables vertical adjustment of the display module (110) relative to a base unit (150), allowing alignment with a user's eye level to reduce neck and back strain during prolonged use. A rotation assembly (130) permits the display module (110) to switch between landscape and portrait orientations, providing versatility for tasks such as reading, coding, design, and collaboration. The elevation assembly (120) and rotation assembly (130) are integrated into a unified structural frame (140) that ensures durability, stability, and smooth operation. The base unit (150) houses essential computing hardware and is designed to optimize airflow and heat dissipation. Constructed from lightweight and durable materials, the computing device (100) delivers a portable, flexible, and user-friendly solution without reliance on external accessories.

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

The Department of Computer Science and Engineering proudly announces the publication of a patent titled “**Computing Device**” by the Indian Patent Office. The patent application (**Application No. 202511099056 A**) was published on 12 December 2025, marking another significant milestone in the department’s research and innovation journey.

The patent has been filed by G.L. Bajaj Institute of Technology and Management, Greater Noida, with a team of distinguished faculty members and researchers from the CSE department as inventors.

Additionally, the computing device features a unified structural frame that ensures durability, stability, and smooth operation.

Inventors:

Dr. Vrinda Sachdeva

Dr. Neeru Singh

Dr. Rupa Rani Sharma

Dr. Paramjeet Kaur

Dr. Arun Kumar

Mr. Shikhar Prateek Pandey

Ms. Supriya

The department congratulates the entire team for this notable achievement. This patent publication reflects the CSE department’s strong focus on research-driven innovation, interdisciplinary collaboration, and the development of practical solutions that enhance user experience and technological advancement.



Research & Publication

Achievement in Research & Publication->

Blockchain based Electronic Voting System for Secure and Transparent Elections in India

Sahil Hussain^a, Harsh Deep^b, Aadhyaa Pahariya^c, Prabhat Kumar Maurya^d, Pushpa Singh^e

^{a,b,c,d,e}Computer Science & Engineering, G.L. Bajaj Institute of Technology and Management, Greater Noida, 201306, India

^asahilhusain790@gmail.com, ^bharshdeepgupta2002@gmail.com, ^caadhyaapahariya7705@gmail.com, ^dprabhatkm2022@gmail.com,

^epushpa.gla@gmail.com

Abstract:

Blockchain's technologies have the potential to revolutionize the voting system by introducing greater transparency, security, immutability and trust in the electoral process. Traditional voting methods often face challenges such as vote tampering, low voter turnout, and lack of verifiability. This paper discusses the security of the electoral process, addressing problems like voter impersonation, hacking, and tampering of votes. The aim of this paper is to discuss the implementation of blockchain technologies in the existing voting system. The proposed blockchain-based electronic voting system (BEVM) has two modules: Admin and User. Admin modules can create a new election, add the candidates, and count the votes. The user module can see the list of candidates contesting in elections and cast their vote. The voting process is carried out as a smart contract and processed over the Ganache Blockchain Server. The user casts their vote using their MetaMask account, and the Admin system verifies that the transaction has occurred. The blockchain, with its decentralized ledger, allows for transparency and security of election results. The immutability characteristic assures the integrity of the voting process by eliminating the chance of tampering.

Faculty members and students of the Department have successfully published a research paper titled **“Blockchain Based Electronic Voting System for Secure and Transparent Elections in India.”**

The research work has been authored by **Sahil Hussain, Harsh Deep, Aadhyaa Pahariya, Prabhat Kumar Maurya, and Pushpa Singh.**

The paper proposes a secure and transparent electronic voting framework using blockchain technology, leveraging smart contracts and decentralization to prevent vote tampering and enhance trust in the electoral process.

This achievement highlights the department's strong focus on emerging technologies such as Blockchain, Cybersecurity, and E-Governance, and its commitment to impactful, application-oriented research.



Research & Publication

Achievement in Research & Publication->

Factors affecting customer relationship management on consumer behaviour in real estate sector - a study of Delhi-NCR

Narendra Singh, [Mukul Gupta](#) and Pushpa Singh

Published Online: 23 Dec 2025



Abstract & Keywords



Share

Abstract

This study aims to identify the significant attributes of consumer behaviour from CRM services in the real estate sector. The data were collected from residents of Delhi-NCR in order to accomplish the objective. The exploratory factor analysis, confirmatory factor analysis and structural equation modelling were used to identify the significant attributes of consumer behaviour from CRM services. This study revealed four attractive dimensions from residents of Delhi-NCR. These dimensions are service and support facilitation, communication facilitations, purchases and safety facilitations, and recreational facilities. This study concluded that identified dimensions play a significant role in affecting customer relationship management on consumer behaviour in the real estate sector. The findings and recommendations related to identifying factors were well discussed in terms of the relationship between CRM and consumer behaviour. This research empowers the residential real estate developers and makes them better positioned to design the policies.

Another significant research contribution from the Department is the publication of the paper titled **“Factors Affecting Customer Relationship Management on Consumer Behaviour in the Real Estate Sector: A Study of Delhi-NCR.”**

The study has been authored by **Narendra Singh, Mukul Gupta, and Pushpa Singh** and was published online on 23 December 2025.

The research examines key CRM attributes influencing consumer behaviour in the real estate sector using advanced analytical techniques such as Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modelling (SEM). The study identifies critical dimensions including service and support facilitation, communication facilitation, purchase and safety facilitation, and recreational facilities.

This work provides valuable insights for real estate developers and policymakers to design customer-centric strategies and reinforces the department’s commitment to high-quality, industry-relevant research.



Alumni Meet

Isha Rastogi

Batch: 2020-2024

Company: EY GDS

Designation: Associate
Consultant 2

Address: Noida



Shashank Kumar

Batch: 2020 to 2024

Company: Commvault

Designation: SDE

Address: Bengaluru,
Karnataka



Professional Milestone

Achievement & Research Highlight: Dr. Sonal Gandhi

We are proud to share that **Dr. Sonal Gandhi** has successfully completed her **PhD from Delhi Technological University (DTU)**, marking a significant milestone in her academic journey. Her doctoral work reflects strong research rigor, perseverance, and impactful contributions to the field of Image Processing with a focus on Data Hiding.

During her PhD, Dr. Gandhi built an impressive research portfolio, including four SCI-indexed journal publications, two conference papers, two book chapters, and two patents, demonstrating both academic excellence and innovation.



Signal, Image and Video Processing (2025) 19:1407
<https://doi.org/10.1007/s11002-025-04991-y>

ORIGINAL PAPER

Reversible data hiding for color images using a novel self-attention based CNN predictor and error adjustment

Sonal Gandhi^{1,2} · Rajeev Kumar¹

Received: 2 December 2024 / Revised: 17 September 2025 / Accepted: 16 November 2025
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Abstract
In prediction-based reversible data hiding (RDH), achieving high prediction accuracy is essential for obtaining high-fidelity marked images with increased embedding capacity. To this end, this paper proposes two novel techniques: a self-attention-based convolutional neural network predictor (SA-CNNP) and an error adjustment strategy for color images. The SA-CNNP effectively captures both local characteristics and global pixel dependencies, resulting in comprehensive coverage and improved prediction accuracy. The error adjustment strategy further enhances accuracy by refining the prediction errors of two color channels using the error distribution of a reference channel, thereby promoting inter-channel consistency. Experimental results demonstrate that these innovations lead to significant improvements. More specifically, the proposed SA-CNNP achieves a sharper prediction error histogram with approximately 8% improvement in MSE over the best known state-of-the-art predictor. Additionally, the error adjustment strategy increases prediction accuracy for 'Kodim99' color image by 58%. Consequently, the proposed RDH approach achieves an average PSNR gain of around 1.2 dB compared to existing methods for color images.

Keywords Reversible data hiding · CNN · Color image · Embedding capacity · Self-Attention

1 Introduction

In today's digital age, Reversible Data Hiding (RDH) has gained more prominence due to its capability of allowing covert communication, with the lossless restoration of the original cover [10]. This has led to the development of a variety of RDH works [8, 9] such as Lossless Compression, Prediction-based, Histogram Shifting [6, 7], etc. Among them, prediction-based RDH methods usually provide the highest embedding efficiency because of their ability to efficiently exploit the prevalent image correlation. In these methods, prediction methodology (in short "Predictor") plays a pivotal role as higher prediction accuracy translates to

higher embedding efficiency. In literature, various predictors, such as difference predictor (DP) [28], median edge detection [27], gradient adaptive predictor [3], chaotic predictor (RP) [25], XGBoost [17] and Comprehensive RP [16] have been introduced with an aim to improve the prediction accuracy. However, these traditional predictors have performance limitations as they only use a few neighboring pixels as context and struggle to establish non-linear relationships between the pixels.

1.1 Deep learning based predictors

To address the limitations of aforementioned traditional predictors, Hu et al. [13] introduced a convolutional neural network-based predictor (CNNP) that leverages the multi-receptive field and complex computation capabilities of CNN. The CNNP first partitions the original image into two independent sets as shown in Fig. 1 and then predicts one from the other, thus exploiting a larger set of context pixels along with the nonlinear relationship among them.

To enhance performance, Hu et al. [14] modified the image-division strategy used in CNNP training and implemented predictor error ordering (PEO) for embedding.

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² Department of Computer Science and Engineering, G. L. Bajaj Institute of Technology and Management, Greater Noida, India

Published online: 04 December 2025



Further strengthening her research credentials, Dr. Gandhi has published an SCI-indexed journal paper titled "Reversible Data Hiding for Color Images Using a Novel Self-Attention Based CNN Predictor and Error Adjustment" in Signal, Image and Video Processing (Springer Nature). The work introduces a self-attention-based CNN predictor that significantly improves embedding capacity and visual quality, achieving an average PSNR gain of ~1.2 dB over existing methods. The department congratulates Dr. Sonal Gandhi on her outstanding achievements and wishes her continued success in her academic and research endeavors.



Bytes & Breakthroughs

Cybersecurity Predictions for 2026 Highlight New Threat Vectors

Industry reports released in December 2025 detailed emerging attack methods (AI-generated malware, OT/ICS vulnerabilities, deepfake fraud), urging organizations to adopt advanced Zero-Trust models.

Related Research Opportunities:

- Secure software architecture & Zero-Trust protocol design
- Automated vulnerability discovery using program analysis

“LightGen” – All-Optical Photonic Computing Chip Demonstrated

Chinese researchers unveiled a photonic chip with millions of optical neurons, capable of massive parallel computation at much lower power than silicon-based systems.

Related Research Opportunities:

- Algorithms for photonic/optical computing architectures
- New compiler backends for photonic hardware

Multi-Cloud & Edge Computing Adoption Surges

December reports highlighted strong migration toward distributed, multi-cloud, and edge architectures, driven by IoT, real-time apps, and cost optimization.

Related Research Opportunities:

- Distributed computing algorithms (consensus, replication, scheduling)
- Serverless architecture optimization & cold-start minimization

Industrial IoT Conferences Highlight “Predictive Automation”

December IIoT events emphasized predictive maintenance, sensor data fusion, and secure autonomous factories.

Related Research Opportunities:

- Sensor fusion algorithms
- Real-time data streaming & processing pipelines

IEDM 2025 Showcases Next-Gen Semiconductor Research

The IEEE International Electron Devices Meeting (Dec 6–10, 2025) presented breakthroughs in nanoscale transistor design, memory materials, neuromorphic chips, and 2D semiconductors.

Related Research Opportunities:

- Hardware–software co-design for new chip architectures
- Compiler optimization for novel instruction sets (RISC-V, neuromorphic chips)

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