

Online Secure Transaction System with Crpytography

¹Dr.C.Dastagiraiah, ²B.Venkatesh, ³A.Tejaswini, ⁴E.Sruthi

¹Assistant Professor, Department of Computer science and Engineering, Anurag University, Hyderabad, Telangana – 500088, India.

²Department of Computer science and Engineering, Anurag University, Hyderabad, Telangana – 500088, India.

³Department of Computer science and Engineering, Anurag University, Hyderabad, Telangana – 500088, India.

⁴Department of Computer science and Engineering, Anurag University, Hyderabad, Telangana – 500088, India.

¹dastagiraiah.cse@anurag.edu.in

²21eg105b06@anurag.edu.in

³21eg105b01@anurag.edu.in

⁴21eg105b15@anurag.edu.in

Abstract. In today's digital age, secure online transactions are crucial for maintaining the confidentiality, integrity, and authenticity of sensitive data. This project presents a Secure Online Transaction System developed in Java, utilizing MySQL as the database management system, and employing the AES (Advanced Encryption Standard) algorithm for encryption purposes. The objective of this project was to design and implement a robust system that ensures secure online transactions, safeguarding against unauthorized access, data breaches, and fraudulent activities. To achieve this, the project leveraged the AES algorithm, a widely adopted symmetric encryption algorithm known for its high level of security and performance. The system architecture includes a client-server model, where the clients are responsible for initiating and executing transactions, while the server manages the transaction requests and interacts with the MySQL database. The Java programming language was used to develop the client and server components, facilitating platform independence and ease of deployment. To secure the sensitive transaction data during transmission and storage, the AES algorithm was implemented. The AES algorithm operates on 128-bit blocks and supports key lengths of 128, 192, and 256 bits. It provides robust encryption and decryption functions, ensuring that the data remains confidential and tamper-proof. The keys used in the AES algorithm were securely generated and managed within the system. The MySQL database was employed to store transaction-related information, user credentials, and other relevant data. The integration of MySQL allowed for efficient data management and retrieval, with appropriate security measures implemented to protect against SQL injection attacks and unauthorized database access. The implemented Secure Online Transaction System with Cryptography successfully provides a secure environment for users to conduct online transactions. The utilization of the AES algorithm ensures the confidentiality and integrity of the transaction data, protecting it from unauthorized access and tampering. The systems integration with MySQL enables efficient and reliable data management, further enhancing the overall user experience. The outcomes of this project contribute to the field of secure online transactions by demonstrating the successful implementation of cryptography techniques using the AES algorithm. The developed system serves as a practical example of how Java, MySQL, and AES can be combined to create a robust and secure online transaction platform. The projects findings can benefit individuals, businesses, and financial institutions by providing them with a secure framework for conducting online transactions and protecting sensitive information.

Keywords. Secure Online Transaction, Cryptography, AES Algorithm, Java, MySQL, Encryption, Decryption, Data Security, Authentication, Confidentiality, Integrity, Digital Payments, Cybersecurity Client-Server Model, Secure Data Transmission.

INTRODUCTION

In the digital era, online transactions have become an integral part of financial activities, making security a top priority. The Secure Online Transaction System is designed to provide a safe and efficient platform for conducting financial transactions while ensuring data confidentiality, integrity, and authenticity. This system is developed using Java for backend processing, MySQL for database management, and employs the AES (Advanced Encryption Standard) algorithm to encrypt sensitive transaction data. By integrating cryptographic techniques, the system safeguards user information from unauthorized access, cyber threats, and fraudulent activities. The primary objective is to offer a reliable and user-friendly transaction platform that enhances security while maintaining seamless banking operations. This system can be utilized by individuals, businesses, and financial institutions to ensure secure digital transactions and prevent data breaches.

Motivation

With the rapid growth of digital payments, ensuring the security of online transactions has become a major concern. Cryptography plays a crucial role in protecting sensitive financial data by providing confidentiality, integrity, authentication, and non-repudiation. By leveraging encryption, hashing, digital signatures, and secure key exchange mechanisms, cryptographic techniques ensure that online transactions remain safe from cyber threats such as fraud, data breaches, and identity theft.

One of the fundamental aspects of secure transactions is encryption, which converts sensitive data into an unreadable format to prevent unauthorized access. Symmetric encryption algorithms like AES (Advanced Encryption Standard) are widely used for their speed and security, while asymmetric encryption techniques like RSA (Rivest-Shamir-Adleman) and ECC (Elliptic Curve Cryptography) provide additional security for key exchange and authentication. These encryption methods ensure that data transmitted over the internet remains protected from hackers and eavesdroppers.

To verify the authenticity of transactions, digital signatures are employed. These signatures, generated using hashing (SHA-256) and public-key cryptography (RSA or ECDSA), ensure that the sender is legitimate and the transaction has not been tampered with. Digital signatures also provide non-repudiation, meaning the sender cannot later deny initiating the transaction. Hashing algorithms like SHA-256 play a crucial role in maintaining data integrity by creating a unique fingerprint for each transaction. If any data is altered, the hash output changes entirely, flagging possible fraud or tampering.

Secure online transactions also rely on secure key exchange protocols such as Diffie-Hellman (DH) and Elliptic Curve Diffie-Hellman (ECDH). These protocols allow two parties to securely establish an encryption key without interception, ensuring safe communication between users and financial institutions. Furthermore, Multi-Factor Authentication (MFA), including One-Time Passwords (OTPs) generated using HMAC-based OTP (HOTP) or Time-based OTP (TOTP), adds an extra layer of security by requiring users to verify their identity through additional authentication factors such as SMS codes or biometric recognition.

LITERATURE SURVEY

Author(s)	Method	Advantages	Disadvantages
A. Yadva	Design and analysis of a digital true random number generator (TRNG) using ASIC.	Offers a completely digital-based RNG system, avoiding the high power and area demands of analog circuits.	Focuses only on ASIC implementation, limiting the exploration of alternative technologies or methods.
A. Hedayati	Analysis of identity theft, related frauds, techniques, and prevention.	Provides comprehensive techniques for ID theft prevention and raises awareness through training.	The analysis relies heavily on conceptual reviews rather than empirical evidence.
V. L. Reddy and T. Anusha	Combines steganography and visual cryptography for online payment systems.	Safeguards customer data, increases confidence, and prevents identity theft in CNP transactions.	The scalability and integration of this method in existing systems are not extensively addressed.
Bhusari, V., and S. Patil	Credit card fraud detection using the Hidden Markov Model (HMM).	Detects fraudulent transactions with high fraud coverage and low false alarm rates.	Limited to credit card fraud detection and dependent on HMM assumptions.
Joseph Gualdoni et al.	Secure Online Transaction Algorithm (SOTA) using two-factor authentication.	Reduces risks of identity theft and fraudulent purchases through mobile-based random code generation.	Requires mobile device access and could face usability challenges for certain user demographics.

PROPOSED SYSTEM

The proposed methodology focuses on enhancing the security and efficiency of online transactions by integrating cryptographic techniques and database security measures. It addresses the limitations of existing systems by implementing improved security protocols to ensure data confidentiality, integrity, and authentication. The Advanced Encryption Standard (AES) is utilized as a robust symmetric encryption algorithm to safeguard transaction data during transmission and storage, effectively preventing unauthorized access and potential breaches. Additionally, a MySQL database is incorporated to manage transaction records and user credentials securely, with measures in place to prevent SQL injection and unauthorized access attempts.

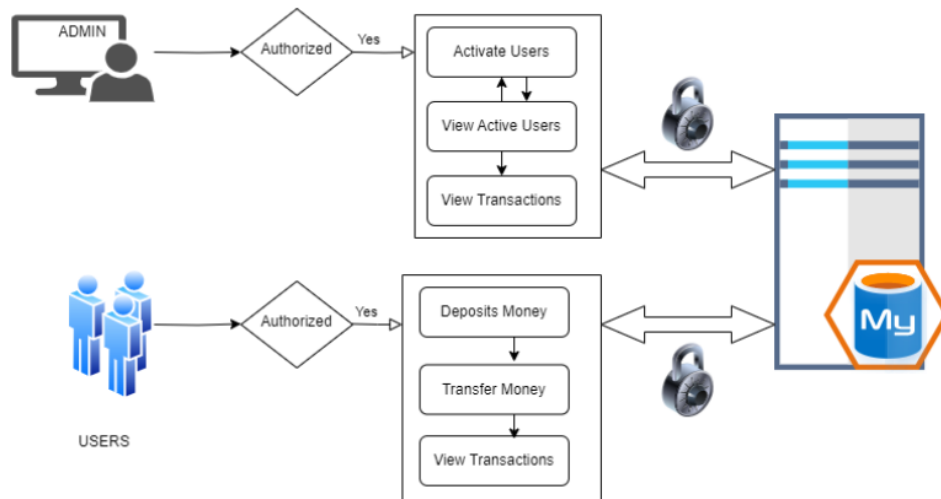
To further optimize performance, the system is designed with scalability in mind, ensuring seamless transaction processing even during peak usage periods. Efficient algorithms and database optimization techniques are employed to maintain high responsiveness and reduce latency. The secure environment provided by this system offers users a reliable platform for conducting online transactions, effectively safeguarding sensitive data against cyber threats. By integrating these advanced security and performance enhancements, the proposed methodology ensures a safe, efficient, and user-friendly online transaction experience.

Model Implementation

The system architecture for secure online transactions is designed to provide a robust and efficient platform for both administrators and users while ensuring data integrity, confidentiality, and authentication. The admin plays a crucial role in managing user activities and monitoring transactions. Upon successful authorization, the admin can activate new users, view active users, and track financial transactions, ensuring transparency and security. These functionalities allow administrators to oversee the system efficiently and detect any suspicious activities, thereby enhancing overall security.

On the other hand, users gain access to essential financial operations only after successful authentication. They can deposit money, transfer funds securely, and view their transaction history. The integration of a MySQL database ensures the secure storage and management of user credentials and transaction records. Cryptographic security measures, including encryption techniques, protect sensitive data from unauthorized access, while authentication mechanisms verify users before granting access. This architecture creates a scalable, secure, and efficient environment for online transactions, reinforcing trust and reliability for all stakeholders.

SYSTEM ARCHITECTURE:



DATA FLOW DIAGRAM

The Data Flow Diagram (DFD), also known as a bubble chart, is a simple yet powerful graphical representation used to illustrate how data moves through a system. It visually depicts the input data, the processing steps, and the output data generated by the system. By breaking down complex systems into easily understandable components, DFDs help in system analysis and design.

The DFD is one of the most important modeling tools used to represent system components. These components include system processes, data stores, external entities, and information flows that interact within the system. It effectively shows how data is received, processed, and transferred between various entities, ensuring a clear understanding of system functionality.

A DFD also highlights the transformations that data undergoes as it moves from input to output. Through its graphical representation, it provides a structured way to analyze and document system processes, making it a vital tool in software development and business process modeling. Since DFDs can represent a system at various levels of abstraction, they can be partitioned into different layers, each offering deeper insights into the flow of information and system operations. This hierarchical structure allows for better understanding and refinement of complex processes, ensuring efficient system design and implementation.

Testing and Validation

Testing and validation play a crucial role in ensuring the reliability, security, and performance of software applications. The testing process aims to identify defects, verify compliance with requirements, and ensure smooth functionality before deployment. Various testing methodologies, such as unit testing, integration testing, and system testing, are employed to validate individual components and their interactions. Each stage of testing ensures that errors are detected early, reducing potential risks in later phases. By implementing rigorous testing protocols, developers can enhance software quality and user satisfaction while minimizing system failures and vulnerabilities. Validation, on the other hand, ensures that the software meets the intended business and technical requirements. It verifies whether the software system is built correctly and whether it fulfills its intended purpose efficiently. Validation techniques, such as functional testing, performance testing, and user acceptance testing, help confirm that the software meets both user expectations and industry standards. A well-structured validation process helps in reducing discrepancies between system output and desired functionality, ensuring that the software delivers the expected results.

A comprehensive testing and validation strategy includes automated and manual testing approaches. Automated testing helps in quickly detecting defects and performing repetitive tasks efficiently, while manual testing allows testers to evaluate the system from a user perspective. Security testing is also essential to safeguard against vulnerabilities and potential threats. By adopting best practices in testing and validation, organizations can ensure robust software performance, maintain system integrity, and build user confidence in their applications.

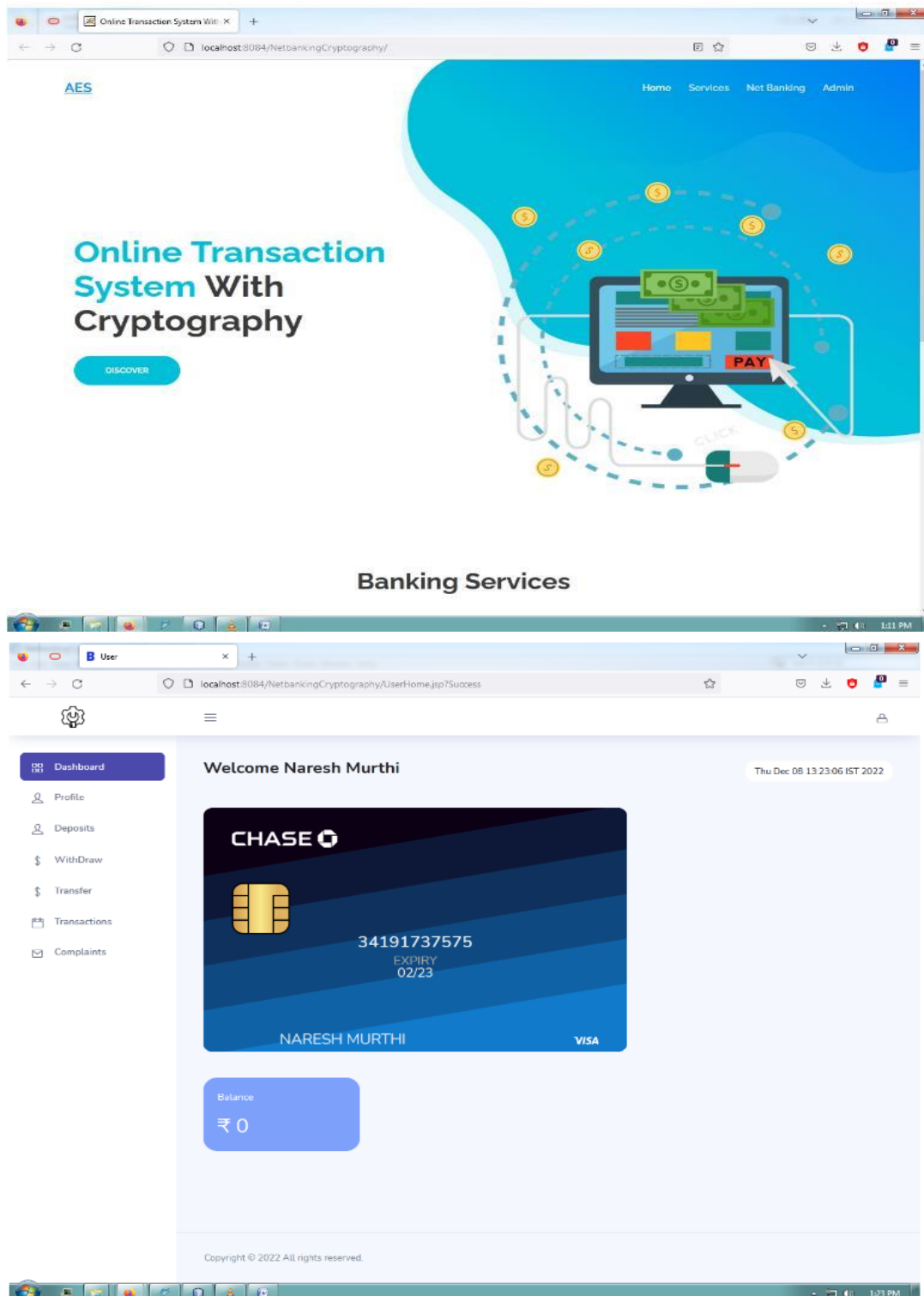
Tools Used

The development of the system utilizes a combination of advanced tools and technologies to ensure efficiency, security, and seamless performance. It operates on Windows 11, providing a stable environment, with Java as the primary programming language for secure and scalable backend development. Apache NetBeans IDE 16 or later is used for coding, debugging, and project management, enhancing development productivity. For database management, MySQL is integrated to efficiently store and retrieve transactional data while ensuring data integrity and security. The frontend is built using JSP, CSS, and JavaScript, where JSP enables dynamic content rendering, CSS enhances the visual appeal, and JavaScript ensures interactivity and responsiveness. This combination of tools and technologies creates a well-structured, scalable, and high-performing system that meets industry standards for security and efficiency.

RESULTS

The Online Transaction System with Cryptography ensures secure and encrypted financial transactions with a user-friendly interface and seamless navigation. The user dashboard provides an overview of the account,

featuring virtual card details and essential banking functionalities like deposits, withdrawals, transfers, and transaction history.



CONCLUSION

Online Transaction System with Cryptography provides a secure and efficient platform for digital banking. By integrating encryption techniques, it ensures the confidentiality and integrity of financial transactions. The user-friendly interface enhances accessibility, making banking operations seamless. Features like virtual cards, transaction history, and secure fund transfers offer a comprehensive digital banking experience. The system

prioritizes user data protection, minimizing risks of fraud and unauthorized access. Overall, it serves as a reliable and secure solution for modern financial transactions.

REFERENCES

1. Reddy, C. N. K., & Murthy, G. V. (2012). Evaluation of Behavioral Security in Cloud Computing. *International Journal of Computer Science and Information Technologies*, 3(2), 3328-3333.
2. Murthy, G. V., Kumar, C. P., & Kumar, V. V. (2017, December). Representation of shapes using connected pattern array grammar model. In *2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)* (pp. 819-822). IEEE.
3. Krishna, K. V., Rao, M. V., & Murthy, G. V. (2017). Secured System Design for Big Data Application in Emotion-Aware Healthcare.
4. Rani, G. A., Krishna, V. R., & Murthy, G. V. (2017). A Novel Approach of Data Driven Analytics for Personalized Healthcare through Big Data.
5. Rao, M. V., Raju, K. S., Murthy, G. V., & Rani, B. K. (2020). Configure and Management of Internet of Things. *Data Engineering and Communication Technology*, 163.
6. Balakrishna, G., Murthy, G. V., Rao, M. N., & Narayana, M. V. (2022). Implementing Solar Power Smart Irrigation System. In *Innovations in Computer Science and Engineering: Proceedings of the Ninth ICICSE, 2021* (pp. 561-567). Singapore: Springer Singapore.
7. Reddy, S. R., & Murthy, G. V. (2025). Cardiovascular Disease Prediction Using Particle Swarm Optimization and Neural Network Based an Integrated Framework. *SN Computer Science*, 6(2), 186.
8. Murthy, G. V., & Kumar, V. V. (2014). A new model of array grammar for generating connected patterns on an image neighborhood. *arXiv preprint arXiv:1407.8337*.
9. Murthy, G. V., SwathiReddy, M., & Balakrishna, G. (2019, May). Big Data Analytics for Popularity Prediction. In *Journal of Physics: Conference Series* (Vol. 1228, No. 1, p. 012051). IOP Publishing.
10. Kumar, K. M., Latha, P. S., & Murthy, G. V. (2017). Two Stage: Smart Crawler for Analysis of Web Data.
11. Ramakrishna, C., Kumar, G. K., Reddy, A. M., & Ravi, P. (2018). A Survey on various IoT Attacks and its Countermeasures. *International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)*, 5(4), 143-150.
12. Madar, B., Kumar, G. K., & Ramakrishna, C. (2017). Captcha breaking using segmentation and morphological operations. *International Journal of Computer Applications*, 166(4), 34-38.
13. Ramakrishna, C., Kumar, G. S., & Reddy, P. C. S. (2021). Quadruple band-notched compact monopole UWB antenna for wireless applications. *Journal of Electromagnetic Engineering and Science*, 21(5), 406-416.
14. Chithanuru, V., & Ramaiah, M. (2023). An anomaly detection on blockchain infrastructure using artificial intelligence techniques: Challenges and future directions—A review. *Concurrency and Computation: Practice and Experience*, 35(22), e7724.
15. Ramaiah, M., Chithanuru, V., Padma, A., & Ravi, V. (2022). A review of security vulnerabilities in industry 4.0 application and the possible solutions using blockchain. *Cyber Security Applications for Industry 4.0*, 63-95.
16. Padma, A., Chithanuru, V., Uppamma, P., & VishnuKumar, R. (2024). Exploring Explainable AI in Healthcare: Challenges and Future Directions. In *Analyzing Explainable AI in Healthcare and the Pharmaceutical Industry* (pp. 199-233). IGI Global.
17. Prashanth, J. S., & Nandury, S. V. (2015, June). Cluster-based rendezvous points selection for reducing tour length of mobile element in WSN. In *2015 IEEE International Advance Computing Conference (IACC)* (pp. 1230-1235). IEEE.
18. Prashanth, J. S., & Nandury, S. V. (2019). A Cluster—based Approach for Minimizing Energy Consumption by Reducing Travel Time of Mobile Element in WSN. *International Journal of Computers Communications & Control*, 14(6), 691-709.
19. Kumar, K. A., Pabboju, S., & Desai, N. M. S. (2014). Advance text steganography algorithms: an overview. *International Journal of Research and Applications*, 1(1), 31-35.
20. Shyam, D. N. M., & Hussain, M. A. (2023). Mutual authenticated key agreement in Wireless Infrastructure-less network by Chaotic Maps based Diffie-Helman Property. *Fusion: Practice & Applications*, 13(2).
21. Shyam, D. N. M., & Hussain, M. A. (2023). A Naive Bayes-Driven Mechanism for Mitigating Packet-Dropping Attacks in Autonomous Wireless Networks. *Ingenierie des Systemes d'Information*, 28(4), 1019.

22. Hnamte, V., & Balram, G. (2022). Implementation of Naive Bayes Classifier for Reducing DDoS Attacks in IoT Networks. *Journal of Algebraic Statistics*, 13(2), 2749-2757.
23. Balram, G., Anitha, S., & Deshmukh, A. (2020, December). Utilization of renewable energy sources in generation and distribution optimization. In *IOP Conference Series: Materials Science and Engineering* (Vol. 981, No. 4, p. 042054). IOP Publishing.
24. Subrahmanyam, V., Sagar, M., Balram, G., Ramana, J. V., Tejaswi, S., & Mohammad, H. P. (2024, May). An Efficient Reliable Data Communication For Unmanned Air Vehicles (UAV) Enabled Industry Internet of Things (IIoT). In *2024 3rd International Conference on Artificial Intelligence For Internet of Things (AIIoT)* (pp. 1-4). IEEE.
25. Balram, G., Poornachandrarao, N., Ganesh, D., Nagesh, B., Basi, R. A., & Kumar, M. S. (2024, September). Application of Machine Learning Techniques for Heavy Rainfall Prediction using Satellite Data. In *2024 5th International Conference on Smart Electronics and Communication (ICOSEC)* (pp. 1081-1087). IEEE.
26. Balram, G., & Kumar, K. K. (2022). Crop field monitoring and disease detection of plants in smart agriculture using internet of things. *International Journal of Advanced Computer Science and Applications*, 13(7).
27. Mahammad, F. S., Viswanatham, V. M., Tahseen, A., Devi, M. S., & Kumar, M. A. (2024, July). Key distribution scheme for preventing key reinstallation attack in wireless networks. In *AIP Conference Proceedings* (Vol. 3028, No. 1). AIP Publishing.
28. Tahseen, A., Shailaja, S. R., & Ashwini, Y. (2024). Extraction for Big Data Cyber Security Analytics. *Advances in Computational Intelligence and Informatics: Proceedings of ICACII 2023*, 993, 365.
29. Tahseen, A., Shailaja, S. R., & Ashwini, Y. (2023, December). Security-Aware Information Classification Using Attributes Extraction for Big Data Cyber Security Analytics. In *International Conference on Advances in Computational Intelligence and Informatics* (pp. 365-373). Singapore: Springer Nature Singapore.
30. Lavanya, P. (2024). Personalized Medicine Recommendation System Using Machine Learning.
31. Lavanya, P. (2024). In-Cab Smart Guidance and support system for Dragline operator.
32. Lavanya, P. (2024). Price Comparison of GeM Products with other eMarketplaces.
33. Kovoov, M., Durairaj, M., Karyakarte, M. S., Hussain, M. Z., Ashraf, M., & Maguluri, L. P. (2024). Sensor-enhanced wearables and automated analytics for injury prevention in sports. *Measurement: Sensors*, 32, 101054.
34. Rao, N. R., Kovoov, M., Kishor Kumar, G. N., & Parameswari, D. V. L. (2023). Security and privacy in smart farming: challenges and opportunities. *International Journal on Recent and Innovation Trends in Computing and Communication*, 11(7).
35. Madhuri, K. (2023). Security Threats and Detection Mechanisms in Machine Learning. *Handbook of Artificial Intelligence*, 255.
36. Madhuri, K., Viswanath, N. K., & Gayatri, P. U. (2016, November). Performance evaluation of AODV under Black hole attack in MANET using NS2. In *2016 international conference on ICT in Business Industry & Government (ICTBIG)* (pp. 1-3). IEEE.
37. Madhuri, K. (2022). A New Level Intrusion Detection System for Node Level Drop Attacks in Wireless Sensor Network. *Journal of Algebraic Statistics*, 13(1), 159-168.
38. Reddy, P. R. S., Bhoga, U., Reddy, A. M., & Rao, P. R. (2017). OER: Open Educational Resources for Effective Content Management and Delivery. *Journal of Engineering Education Transformations*, 30(3), 322-326.
39. Reddy, P. R. S., & Ravindranath, K. (2024). Enhancing Secure and Reliable Data Transfer through Robust Integrity. *Journal of Electrical Systems*, 20, 900-910.
40. REDDY, P. R. S., & RAVINDRANATH, K. (2022). A HYBRID VERIFIED RE-ENCRYPTION INVOLVED PROXY SERVER TO ORGANIZE THE GROUP DYNAMICS: SHARING AND REVOCATION. *Journal of Theoretical and Applied Information Technology*, 100(13).
41. Reddy, B. A., & Reddy, P. R. S. (2012). Effective data distribution techniques for multi-cloud storage in cloud computing. *CSE, Anurag Group of Institutions, Hyderabad, AP, India*.
42. Srilatha, P., Murthy, G. V., & Reddy, P. R. S. (2020). Integration of Assessment and Learning Platform in a Traditional Class Room Based Programming Course. *Journal of Engineering Education Transformations*, 33, 179-184.
43. Raj, R. S., & Raju, G. P. (2014, December). An approach for optimization of resource management in Hadoop. In *International Conference on Computing and Communication Technologies* (pp. 1-5). IEEE.
44. Reddy, P. R. S., Bhoga, U., Reddy, A. M., & Rao, P. R. (2017). OER: Open Educational Resources for Effective Content Management and Delivery. *Journal of Engineering Education Transformations*, 30(3), 322-326.

45. Ramana, A. V., Bhoga, U., Dhulipalla, R. K., Kiran, A., Chary, B. D., & Reddy, P. C. S. (2023, June). Abnormal Behavior Prediction in Elderly Persons Using Deep Learning. In *2023 International Conference on Computer, Electronics & Electrical Engineering & their Applications (IC2E3)* (pp. 1-5). IEEE.
46. Ujwala, B., & Reddy, P. R. S. (2016). An effective mechanism for integrity of data sanitization process in the cloud. *European Journal of Advances in Engineering and Technology*, 3(8), 82-84.
47. DASTAGIRIAH, D. (2024). A System for Analysing call drop dynamics in the telecom industry using Machine Learning and Feature Selection. *Journal of Theoretical and Applied Information Technology*, 102(22).
48. Sudhakar, R. V., Dastagiraiah, C., Pattem, S., & Bhukya, S. (2024). Multi-Objective Reinforcement Learning Based Algorithm for Dynamic Workflow Scheduling in Cloud Computing. *Indonesian Journal of Electrical Engineering and Informatics (IJEI)*, 12(3), 640-649.
49. PushpaRani, K., Roja, G., Anusha, R., Dastagiraiah, C., Srilatha, B., & Manjusha, B. (2024, June). Geological Information Extraction from Satellite Imagery Using Deep Learning. In *2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT)* (pp. 1-7). IEEE.
50. Latha, S. B., Dastagiraiah, C., Kiran, A., Asif, S., Elangovan, D., & Reddy, P. C. S. (2023, August). An Adaptive Machine Learning model for Walmart sales prediction. In *2023 International Conference on Circuit Power and Computing Technologies (ICCPCT)* (pp. 988-992). IEEE.
51. Rani, K. P., Reddy, Y. S., Sreedevi, P., Dastagiraiah, C., Shekar, K., & Rao, K. S. (2024, June). Tracking The Impact of PM Poshan on Child's Nutritional Status. In *2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT)* (pp. 1-4). IEEE.
52. Selvaprasanth, P., Karthick, R., Meenalochini, P., & Prabakaran, A. M. (2025). FPGA implementation of hybrid Namib beetle and battle royale optimization algorithm fostered linear phase finite impulse response filter design. *Analog Integrated Circuits and Signal Processing*, 123(2), 33.
53. Deepa, R., Karthick, R., & Senthilkumar, R. (2025). Performance analysis of multiple-input multiple-output orthogonal frequency division multiplexing system using arithmetic optimization algorithm. *Computer Standards & Interfaces*, 92, 103934.
54. Kumar, T. V., Karthick, R., Nandhini, C., Annalakshmi, M., & Kanna, R. R. (2025). 20 GaN Power HEMT-Based Amplifiers. *Circuit Design for Modern Applications*, 320.
55. Velayudham, A., Karthick, R., Sivabalan, A., & Sathya, V. (2025). IoT enabled smart healthcare system for COVID-19 classification using optimized robust spatiotemporal graph convolutional networks. *Biomedical Signal Processing and Control*, 100, 107104.
56. Gayathri, P., Balamurugan, J., Gowthami, M., Usha, R., Karthick, R., & Selvan, R. S. (2025). Factors Influencing Customers' Inclination to buy Green Products: An Indian Perspective. In *Elevating Brand Loyalty With Optimized Marketing Analytics and AI* (pp. 185-202). IGI Global Scientific Publishing.
57. Ramkumar, G., Bhuvaneswari, J., Venugopal, S., Kumar, S., Ramasamy, C. K., & Karthick, R. (2025). Enhancing customer segmentation: RFM analysis and K-Means clustering implementation. In *Hybrid and Advanced Technologies* (pp. 70-76). CRC Press.
58. Tamilselvi, M., Kalaivani, S. S. S., Sunderasan, V., Sailaja, K., Gopal, D., & Karthick, R. (2025). Deep learning for object detection and identification. In *Hybrid and Advanced Technologies* (pp. 218-223). CRC Press.
59. Sidharth, S. (2022). Zero Trust Architecture: A Key Component of Modern Cybersecurity Frameworks.
60. Sidharth, S. (2018). Optimized Cooling Solutions for Hybrid Electric Vehicle Powertrains.
61. Kumar, T. V. (2024). A Comprehensive Empirical Study Determining Practitioners' Views on Docker Development Difficulties: Stack Overflow Analysis.
62. Kumar, T. V. (2024). A New Framework and Performance Assessment Method for Distributed Deep Neural NetworkBased Middleware for Cyberattack Detection in the Smart IoT Ecosystem.
63. Turlapati, V. R., Thirunavukkarasu, T., Aiswarya, G., Thoti, K. K., Swaroop, K. R., & Mythily, R. (2024, November). The Impact of Influencer Marketing on Consumer Purchasing Decisions in the Digital Age Based on Prophet ARIMA-LSTM Model. In *2024 International Conference on Integrated Intelligence and Communication Systems (ICIICS)* (pp. 1-6). IEEE.
64. Raju, P., Arun, R., Turlapati, V. R., Veeran, L., & Rajesh, S. (2024). Next-Generation Management on Exploring AI-Driven Decision Support in Business. In *Optimizing Intelligent Systems for Cross-Industry Application* (pp. 61-78). IGI Global.
65. Sreekanthaswamy, N., Anitha, S., Singh, A., Jayadeva, S. M., Gupta, S., Manjunath, T. C., & Selvakumar, P. (2025). Digital Tools and Methods. *Enhancing School Counseling With Technology and Case Studies*, 25.

66. Sreekanthaswamy, N., & Hubballi, R. B. (2024). Innovative Approaches To Fmcg Customer Journey Mapping: The Role Of Block Chain And Artificial Intelligence In Analyzing Consumer Behavior And Decision-Making. *Library of Progress-Library Science, Information Technology & Computer*, 44(3).Deshmukh, M. C., Ghadle, K. P., & Jadhav, O. S. (2020). Optimal solution of fully fuzzy LPP with symmetric HFNs. In *Computing in Engineering and Technology: Proceedings of ICCET 2019* (pp. 387-395). Springer Singapore.
67. Chinchodkar, K. N., & Jadhav, O. S. (2017). Development of mathematical model for the solid waste management on dumping ground at Mumbai for the reduction of existence cost. *Int. J. Statist. Syst*, 12, 145-155.
68. Kalluri, V. S. Optimizing Supply Chain Management in Boiler Manufacturing through AI-enhanced CRM and ERP Integration. *International Journal of Innovative Science and Research Technology (IJISRT)*.
69. Kalluri, V. S. Impact of AI-Driven CRM on Customer Relationship Management and Business Growth in the Manufacturing Sector. *International Journal of Innovative Science and Research Technology (IJISRT)*.
70. Kalluri, S. V. S., & Narra, S. (2024). Predictive Analytics in ADAS Development: Leveraging CRM Data for Customer-Centric Innovations in Car Manufacturing. *vol*, 9, 6.
71. Al-Ghanimi, M. G., Hanif, O., Jain, M. V., Kumar, A. S., Rao, R., Kavın, R., ... & Hossain, M. A. (2022, December). Two TS-Fuzzy Controllers based Direct Torque Control of 5-Phase Induction Motor. In *2022 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)* (pp. 1-6). IEEE.
72. Sameera, K., & MVR, S. A. R. (2014). Improved power factor and reduction of harmonics by using dual boost converter for PMBLDC motor drive. *Int J Electr Electron Eng Res*, 4(5), 43-51.
73. Srinivasu, B., Prasad, P. V. N., & Rao, M. R. (2006, December). Adaptive controller design for permanent magnet linear synchronous motor control system. In *2006 International Conference on Power Electronic, Drives and Energy Systems* (pp. 1-6). IEEE.
74. Rao, M. R., & Prasad, P. V. N. (2014). Modelling and Implementation of Sliding Mode Controller for PMBDC Motor Drive. *International journal of advanced research in electrical, electronics and instrumentation engineering*, 3(6).
75. Sidharth, S. (2017). Real-Time Malware Detection Using Machine Learning Algorithms.
76. Sidharth, S. (2017). Access Control Frameworks for Secure Hybrid Cloud Deployments.
77. Kumar, T. V. (2024). Developments and Uses of Generative Artificial Intelligence and Present Experimental Data on the Impact on Productivity Applying Artificial Intelligence that is Generative.
78. Kumar, T. V. (2024). A Comparison of SQL and NO-SQL Database Management Systems for Unstructured Data.
79. Jadhav, V. S., & Jadhav, O. S. (2019). Solving flow-shop scheduling problem to minimize total elapsed time using fuzzy approach. *International Journal of Statistics and Applied Mathematics*, 4(5), 130-133.
80. Deshmukh, M., Ghadle, K., & Jadhav, O. (2020). An innovative approach for ranking hexagonal fuzzy numbers to solve linear programming problems. *International Journal on Emerging Technologies*, 11(2), 385-388.
81. Sidharth, S. (2016). Establishing Ethical and Accountability Frameworks for Responsible AI Systems.
82. Sidharth, S. (2015). AI-Driven Detection and Mitigation of Misinformation Spread in Generated Content.
83. Sharma, S., & Dutta, N. (2024). Examining ChatGPT's and Other Models' Potential to Improve the Security Environment using Generative AI for Cybersecurity.
84. Tambi, V. K., & Singh, N. (2015). Potential Evaluation of REST Web Service Descriptions for Graph-Based Service Discovery with a Hypermedia Focus.
85. Patil, R. D., & Jadhav, O. S. (2016). Some contribution of statistical techniques in big data: a review. *International Journal on Recent and Innovation Trends in Computing and Communication*, 4(4), 293-303.
86. Jadhava, V. S., Buktareb, S. U., & Jadhav, O. S. (2024). Ranking of Octagonal Fuzzy Numbers for Solving Fuzzy Job Sequencing Problem Using Robust Ranking Technique. *Journal of Statistics, Optimization and Data Science*, 1(2), 22-28.
87. Sidharth, S. (2015). Privacy-Preserving Generative AI for Secure Healthcare Synthetic Data Generation.
88. Sidharth, S. (2018). Post-Quantum Cryptography: Readying Security for the Quantum Computing Revolution.
89. Tambi, V. K., & Singh, N. (2019). Development of a Project Risk Management System based on Industry 4.0 Technology and its Practical Implications. *Development*, 7(11).
90. Chaudhari, S. A., Gawali, B. W., & Jadhav, O. S. (2022). Statistical analysis of EEG data for attention deficit hyperactivity disorder. *Journal of Positive School Psychology*, 4046-4053.

91. Jadhav, S., Machale, A., Mharnur, P., Munot, P., & Math, S. (2019, September). Text based stress detection techniques analysis using social media. In *2019 5th International Conference On Computing, Communication, Control And Automation (ICCUBE)* (pp. 1-5). IEEE.
92. Thepade, D. S., Mandal, P. R., & Jadhav, S. (2015). Performance Comparison of Novel Iris Recognition Techniques Using Partial Energies of Transformed Iris Images and Energy Compaction With Hybrid Wavelet Transforms. In *Annual IEEE India Conference (INDICON)*.
93. Kiran, A., Sonker, A., Jadhav, S., Jadhav, M. M., Naga Ramesh, J. V., & Muniyandy, E. (2024). Secure Communications with THz Reconfigurable Intelligent Surfaces and Deep Learning in 6G Systems. *Wireless Personal Communications*, 1-17.
94. Anitha, C., Tellur, A., Rao, K. B., Kumbhar, V., Gopi, T., Jadhav, S., & Vidhya, R. G. (2024). Enhancing Cyber-Physical Systems Dependability through Integrated CPS-IoT Monitoring. *International Research Journal of Multidisciplinary Scope*, 5(2), 706-713.
95. Vandana, C. P., Basha, S. A., Madijagan, M., Jadhav, S., Matheen, M. A., & Maguluri, L. P. (2024). IoT resource discovery based on multi faected attribute enriched CoAP: smart office seating discovery. *Wireless Personal Communications*, 1-18.
96. Jadhav, S., Durairaj, M., Reenadevi, R., Subbulakshmi, R., Gupta, V., & Ramesh, J. V. N. (2024). Spatiotemporal data fusion and deep learning for remote sensing-based sustainable urban planning. *International Journal of System Assurance Engineering and Management*, 1-9.
97. Jadhav, S., Chaudhari, V., Barhate, P., Deshmukh, K., & Agrawal, T. (2021). Extreme Gradient Boosting for Predicting Stock Price Direction in Context of Indian Equity Markets. In *Intelligent Sustainable Systems: Selected Papers of WorldS4 2021, Volume 2* (pp. 321-330). Singapore: Springer Nature Singapore.
98. Jadhav, S., Chaudhari, V., Barhate, P., Deshmukh, K., & Agrawal, T. (2021). REVIEW PAPER ON: ALGORITHMIC TRADING USING ARTIFICIAL INTELLEGEENCE.
99. Thamma, S. R. T. S. R. (2024). Optimization of Generative AI Costs in Multi-Agent and Multi-Cloud Systems.
100. Alsudairy, M. A. T., & Vasista, T. G. K. (2014, May). CRASP—a strategic methodology perspective for sustainable value chain management. In *Proceedings of the 23rd IBIMA Conference*.
101. Vasista, T. G. K., & AlAbdullatif, A. M. (2015). Turning customer insights contributing to VMI based decision support system in demand Chain management. *International Journal of Managing Value and Supply Chains*, 6(2), 37-45.
102. AlSudairi, M., & Vasista, T. G. K. (2012, September). Service design systems driven innovation approach for total innovation management. In *Proceedings of the 7th European Conference on Innovation and Entrepreneurship: ECIE* (p. 8). Academic Conferences Limited.
103. Vasista, T. G. K. (2007). Wise CRM engine. *Synergy-The Journal of Marketing*, 5(1), 123-127.
104. Vasista, T. G. K. (2016). Thoughtful approaches to implementation of electronic rulemaking. *Int. J. Manag. Pub. Sect. Inf. Commun. Technol*, 7(2), 43-53.
105. Vasista, T. G. K. (2015). Strategic Business Challenges in Cloud Systems. *Int. J. Cloud Comput. Serv. Archit.*, 5(4), 1-3.
106. Vasista, T. G. K. (2013). System, spiritual and philosophical perspectives of human life and the role of governance in a socio-economic setting. *Unpublished Paper Developed at King Saud University, Riyadh, KSA*.
107. Thamma, S. R. T. S. R. (2024). Revolutionizing Healthcare: Spatial Computing Meets Generative AI.
108. Kalaiselvi, B., & Thangamani, M. (2020). An efficient Pearson correlation based improved random forest classification for protein structure prediction techniques. *Measurement*, 162, 107885.
109. Prabhu Kavim, B., Karki, S., Hemalatha, S., Singh, D., Vijayalakshmi, R., Thangamani, M., ... & Adigo, A. G. (2022). Machine learning-based secure data acquisition for fake accounts detection in future mobile communication networks. *Wireless Communications and Mobile Computing*, 2022(1), 6356152.
110. Geeitha, S., & Thangamani, M. (2018). Incorporating EBO-HSIC with SVM for gene selection associated with cervical cancer classification. *Journal of medical systems*, 42(11), 225.
111. Thangamani, M., & Thangaraj, P. (2010). Integrated Clustering and Feature Selection Scheme for Text Documents. *Journal of Computer Science*, 6(5), 536.
112. Gangadhar, C., Chanthirasekaran, K., Chandra, K. R., Sharma, A., Thangamani, M., & Kumar, P. S. (2022). An energy efficient NOMA-based spectrum sharing techniques for cell-free massive MIMO. *International Journal of Engineering Systems Modelling and Simulation*, 13(4), 284-288.
113. Narmatha, C., Thangamani, M., & Ibrahim, S. J. A. (2020). Research scenario of medical data mining using fuzzy and graph theory. *International Journal of Advanced Trends in Computer Science and Engineering*, 9(1), 349-355.
114. Thangamani, M., & Thangaraj, P. (2013). Fuzzy ontology for distributed document clustering based on genetic algorithm. *Applied Mathematics & Information Sciences*, 7(4), 1563-1574.

115. Surendiran, R., Aarthi, R., Thangamani, M., Sugavanam, S., & Sarumathy, R. (2022). A Systematic Review Using Machine Learning Algorithms for Predicting Preterm Birth. *International Journal of Engineering Trends and Technology*, 70(5), 46-59.
116. Thangamani, M., & Thangaraj, P. (2010). Ontology based fuzzy document clustering scheme. *Modern Applied Science*, 4(7), 148.
117. Ibrahim, S. J. A., & Thangamani, M. (2018, November). Momentous Innovations in the prospective method of Drug development. In *Proceedings of the 2018 International Conference on Digital Medicine and Image Processing* (pp. 37-41).
118. Thamma, S. R. (2024). Cardiovascular image analysis: AI can analyze heart images to assess cardiovascular health and identify potential risks.
119. Arun, A., Ali A. Alalmi, and D. Gunaseelan. "Operational Need and Importance of Capacity Management into Hotel Industry—A Review." (2020).
120. Gunaseelan, D., & Kumar, G. R. (2024). An umbrella view on food habits in the context of health and sustainability for sports persons. *Salud, Ciencia y Tecnología-Serie de Conferencias*, (3), 890.
121. Gunaseelan, D., & Arun, A. Tourist Destination Satisfaction: Analysis of Kanyakumari the Spot with Scenic Beauty and Spiritual Temples. *Emperor Journal of Economics and Social Science Research*, 3(1).
122. Thamma, S. R. T. S. R. (2024). Generative AI in Graph-Based Spatial Computing: Techniques and Use Cases.
123. Kumar, J. S., Archana, B., Muralidharan, K., & Kumar, V. S. (2025). Graph Theory: Modelling and Analyzing Complex System. *Metallurgical and Materials Engineering*, 31(3), 70-77.
124. Kumar, J. S., Archana, B., Muralidharan, K., & Srija, R. (2025). Spectral Graph Theory: Eigen Values Laplacians and Graph Connectivity. *Metallurgical and Materials Engineering*, 31(3), 78-84.
125. Srija, R., Kumar, J. S., & Muralidharan, K. (2025). An improvement in estimating the population mean by using quartiles and correlation coefficient. *Mathematics in Engineering, Science & Aerospace (MESA)*, 16(1).
126. Kumar, J. S., Murthy, S., Kumar, B. R., & Solaiappam, S. (2017, January). p-Value analyze the set of optimal value in MOFTP. In *2017 4th International Conference on Advanced Computing and Communication Systems (ICACCS)* (pp. 1-5). IEEE.
127. Anandasubramanian, C. P., & Selvaraj, J. (2024). NAVIGATING BANKING LIQUIDITY-FACTORS, CHALLENGES, AND STRATEGIES IN CORPORATE LOAN PORTFOLIOS. *Tec Empresarial*, 6(1).
128. Madem, S., Katuri, P. K., Kalra, A., & Singh, P. (2023, May). System Design for Financial and Economic Monitoring Using Big Data Clustering. In *2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI)* (pp. 1-7). IEEE.
129. Srikanth, V., & Dhanapal, D. R. (2012). E-commerce online security and trust marks. *International Journal of Computer Engineering and Technology*, 3(2), 238-255.
130. Lopez, S., Sarada, V., Praveen, R. V. S., Pandey, A., Khuntia, M., & Haralayya, D. B. (2024). Artificial intelligence challenges and role for sustainable education in india: Problems and prospects. *Sandeep Lopez, Vani Sarada, RVS Praveen, Anita Pandey, Monalisa Khuntia, Bhadrappa Haralayya (2024) Artificial Intelligence Challenges and Role for Sustainable Education in India: Problems and Prospects. Library Progress International*, 44(3), 18261-18271.
131. Yamuna, V., Praveen, R. V. S., Sathya, R., Dhivva, M., Lidiya, R., & Sowmiya, P. (2024, October). Integrating AI for Improved Brain Tumor Detection and Classification. In *2024 4th International Conference on Sustainable Expert Systems (ICSSES)* (pp. 1603-1609). IEEE.
132. Kumar, N., Kurkute, S. L., Kalpana, V., Karuppannan, A., Praveen, R. V. S., & Mishra, S. (2024, August). Modelling and Evaluation of Li-ion Battery Performance Based on the Electric Vehicle Tiled Tests using Kalman Filter-GBDT Approach. In *2024 International Conference on Intelligent Algorithms for Computational Intelligence Systems (IACIS)* (pp. 1-6). IEEE.
133. Sharma, S., Vij, S., Praveen, R. V. S., Srinivasan, S., Yadav, D. K., & VS, R. K. (2024, October). Stress Prediction in Higher Education Students Using Psychometric Assessments and AOA-CNN-XGBoost Models. In *2024 4th International Conference on Sustainable Expert Systems (ICSSES)* (pp. 1631-1636). IEEE.
134. Anuprathibha, T., Praveen, R. V. S., Sukumar, P., Suganthi, G., & Ravichandran, T. (2024, October). Enhancing Fake Review Detection: A Hierarchical Graph Attention Network Approach Using Text and Ratings. In *2024 Global Conference on Communications and Information Technologies (GCCIT)* (pp. 1-5). IEEE.
135. Shinkar, A. R., Joshi, D., Praveen, R. V. S., Rajesh, Y., & Singh, D. (2024, December). Intelligent solar energy harvesting and management in IoT nodes using deep self-organizing maps. In *2024 International Conference on Emerging Research in Computational Science (ICERCS)* (pp. 1-6). IEEE.

136. Praveen, R. V. S., Hemavathi, U., Sathya, R., Siddiq, A. A., Sanjay, M. G., & Gowdish, S. (2024, October). AI Powered Plant Identification and Plant Disease Classification System. In *2024 4th International Conference on Sustainable Expert Systems (ICSES)* (pp. 1610-1616). IEEE.
137. Dhivya, R., Sagili, S. R., Praveen, R. V. S., VamsiLala, P. N. V., Sangeetha, A., & Suchithra, B. (2024, December). Predictive Modelling of Osteoporosis using Machine Learning Algorithms. In *2024 4th International Conference on Ubiquitous Computing and Intelligent Information Systems (ICUIS)* (pp. 997-1002). IEEE.
138. Kemmannu, P. K., Praveen, R. V. S., Saravanan, B., Amshavalli, M., & Banupriya, V. (2024, December). Enhancing Sustainable Agriculture Through Smart Architecture: An Adaptive Neuro-Fuzzy Inference System with XGBoost Model. In *2024 International Conference on Sustainable Communication Networks and Application (ICSCNA)* (pp. 724-730). IEEE.
139. Praveen, R. V. S. (2024). *Data Engineering for Modern Applications*. Addition Publishing House.