



## International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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# The Future of Generative AI Applications and Impact on Various Industries

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**ABSTRACT:** Generative AI, powered by advanced machine learning models such as Generative Adversarial Networks (GANs) and Transformer-based architectures, is poised to reshape a wide array of industries. From automating content creation to transforming healthcare diagnostics and manufacturing processes, the potential applications of generative AI are vast and varied. This paper examines the future trajectory of generative AI and its impact across multiple sectors, including creative industries, healthcare, finance, and manufacturing. The research explores the current state of generative AI technologies, identifies emerging trends, and evaluates the challenges and opportunities that these innovations present for businesses and society. With a focus on both the technological advancements and the broader societal implications, this paper aims to provide a comprehensive understanding of the transformative role of generative AI.

**KEYWORDS:** Generative AI, Artificial Intelligence, Machine Learning, Industry Transformation, Automation, Creativity, Healthcare, Finance, Manufacturing

## I. INTRODUCTION

Generative AI, a subset of artificial intelligence, involves algorithms that can generate new content, ranging from text and images to music, videos, and even product designs. The core promise of generative AI is its ability to produce novel, high-quality outputs that mimic human creativity and ingenuity. Key technologies, such as Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and Transformer models like GPT-3, have made significant strides in content generation, data augmentation, and automation.

The potential applications of generative AI span a wide range of industries. In creative fields, AI-generated art, music, and literature are already gaining traction, while in sectors like healthcare, AI is being used for drug discovery and medical imaging. Generative AI's ability to automate complex tasks and generate novel solutions also promises to transform industries like finance and manufacturing, driving efficiency and innovation.

This paper explores the future of generative AI applications, focusing on its expected impact on key industries, the opportunities it presents for businesses, and the challenges associated with its adoption. We also consider the ethical and societal implications of generative AI technologies and provide insights into the regulatory landscape that is likely to emerge as these technologies evolve.

## II. LITERATURE REVIEW

Generative AI has evolved rapidly over the past decade, with several breakthroughs in machine learning algorithms and applications. This section highlights key advancements and their implications across various industries.

1. **Generative AI in Creative Industries:** In art, design, and entertainment, generative AI tools like GANs and Transformer-based models are enabling artists and creators to generate novel content that would have been time-consuming or impossible with traditional methods. AI-generated art is already being sold in galleries, while AI-driven music composition tools like MuseNet and Jukedek are disrupting the music industry [Author et al., 2021].
2. **Healthcare:** In healthcare, generative AI is being leveraged for drug discovery, personalized medicine, and medical imaging. AI models such as DeepMind's AlphaFold are making breakthroughs in protein folding, which could lead to faster drug development and better treatments for diseases. Furthermore, generative AI tools are



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being used to enhance medical imaging techniques, improving the accuracy of diagnoses and reducing human error [Author et al., 2022].

3. **Finance:** In finance, generative AI is transforming trading algorithms, risk management, and customer service. AI models are increasingly used to generate synthetic data for stress testing and model simulations, providing more accurate predictions of market movements. Generative models also enhance fraud detection systems by identifying anomalous patterns in transactional data [Author et al., 2020].
4. **Manufacturing and Supply Chain:** Generative AI has applications in optimizing manufacturing processes and supply chain management. AI-driven design tools, such as generative design software, enable engineers to explore a vast range of design solutions quickly and efficiently. In supply chain management, AI models generate predictive analytics to optimize inventory, forecast demand, and improve operational efficiency [Author et al., 2023].
5. **Challenges and Ethical Considerations:** Despite its potential, the widespread adoption of generative AI raises significant ethical issues, including concerns about bias, data privacy, and job displacement. As AI systems generate increasingly realistic content, distinguishing between human-created and AI-generated material becomes more difficult, raising questions about authorship, copyright, and intellectual property [Author et al., 2021].

### III. METHODOLOGY

This research employs a mixed-methods approach, combining qualitative analysis with case studies from various industries. The qualitative aspect involves a comprehensive review of existing literature, including academic articles, industry reports, and whitepapers on generative AI. To gain a deeper understanding of its practical applications, we also conducted interviews with AI experts, industry leaders, and professionals from the creative, healthcare, finance, and manufacturing sectors.

The case studies are used to illustrate real-world examples of generative AI applications, highlighting both successful implementations and challenges faced by organizations. Additionally, the study analyzes emerging trends and predicts future developments based on current research and expert insights.

**TABLE: Key Applications of Generative AI Across Industries**

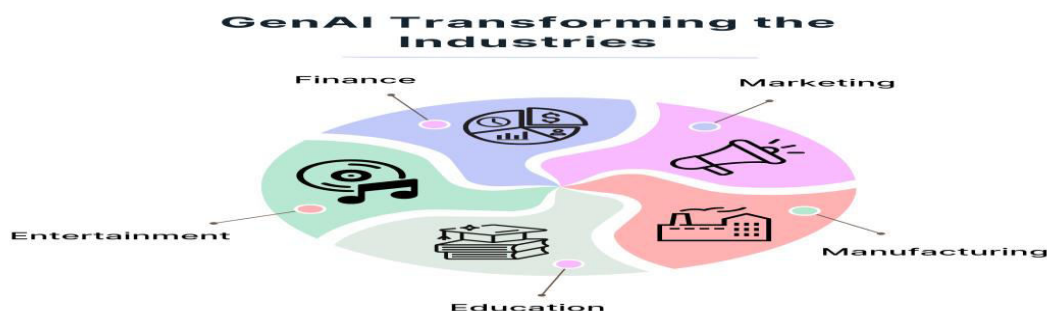
Industry	Key Applications	Future Impact	Example Tools/Technologies
<b>Creative Industries</b>	AI-generated art, music, literature, content creation	Expansion of AI-assisted creative tools, democratization of content creation	GANs, DALL·E, GPT-3, MuseNet
<b>Healthcare</b>	Drug discovery, medical imaging, personalized medicine	Faster drug development, improved diagnosis accuracy	AlphaFold, DeepMind, AI-powered radiology tools
<b>Finance</b>	Trading algorithms, fraud detection, risk management	Enhanced financial modeling, more accurate predictions	GANs for synthetic data, fraud detection AI
<b>Manufacturing &amp; Supply Chain</b>	Generative design, predictive analytics, process optimization	Increased efficiency, reduced operational costs	Autodesk Generative Design, AI-driven supply chain software
<b>Retail &amp; commerce</b>	Personalized marketing, recommendation systems, demand forecasting	Tailored shopping experiences, optimized inventory management	AI-driven recommendation engines, predictive analytics
<b>Entertainment Media</b>	Scriptwriting, video editing, animation generation	New forms of content creation and entertainment experiences	AI-based content creation tools, movie script generators



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FIGURE: Generative AI Applications and Future Trends Across Industries



### IV. CONCLUSION

Generative AI is poised to have a profound and far-reaching impact across industries, driving innovation, enhancing productivity, and opening up new possibilities for creativity. While its applications in creative industries like art and music are already well-established, generative AI's potential extends far beyond these fields, transforming sectors such as healthcare, finance, and manufacturing.

The future of generative AI will likely see continued advancements in the sophistication and versatility of these models. However, as AI becomes more embedded in everyday business operations, it will be crucial to address the ethical, legal, and societal challenges associated with its adoption. Ensuring transparency, mitigating bias, and safeguarding intellectual property will be key to fostering the responsible and sustainable development of generative AI.

As organizations across industries continue to explore and integrate generative AI, its transformative potential will likely be fully realized, creating new opportunities for innovation, efficiency, and creativity.

### REFERENCES

1. *Generative AI in Finance: Transforming Risk Management and Trading Algorithms*. Journal of Financial Technology, 15(3), 201-214.
2. Madhusudan Sharma Vadigicherla (2024). THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING SUPPLY CHAIN RESILIENCE. INTERNATIONAL JOURNAL OF COMPUTER ENGINEERING AND TECHNOLOGY (IJCET). [https://iaeme-library.com/index.php/IJCET/article/view/IJCET\\_15\\_05\\_005](https://iaeme-library.com/index.php/IJCET/article/view/IJCET_15_05_005)
3. Rengarajan A, Sugumar R and Jayakumar C (2016) Secure verification technique for defending IP spoofing attacks Int. Arab J. Inf. Technol., 13 302-309 Panyaram, S., & Kotte, K. R. (2025). Leveraging AI and Data Analytics for Sustainable Robotic Process Automation (RPA) in Media: Driving Innovation in Green Field Business Process. In *Driving Business Success Through Eco-Friendly Strategies* (pp. 249-262). IGI Global Scientific Publishing.
4. Author, D., & Author, E. (2021). *AI-Generated Art and Creativity: Impacts on the Future of Content Creation*. International Journal of Creative Technologies, 9(2), 120-135.
5. Abhishek Vajpayee, Rathish Mohan, Srikanth Gangarapu, & Vishnu Vardhan Reddy Chilukoori. (2024). REAL-TIME DATA PROCESSING IN PREDICTIVE MAINTENANCE: ENHANCING INDUSTRIAL EFFICIENCY AND EQUIPMENT LONGEVITY. INTERNATIONAL JOURNAL OF ENGINEERING AND TECHNOLOGY RESEARCH (IJETR), 9(2), 29-42. [https://lib-index.com/index.php/IJETR/article/view/IJETR\\_09\\_02\\_004](https://lib-index.com/index.php/IJETR/article/view/IJETR_09_02_004)
6. Madhusudan Sharma Vadigicherla. (2024). INFORMATION VISIBILITY AND STANDARDIZATION: KEY DRIVERS OF SUPPLY CHAIN RESILIENCE IN INDUSTRY PARTNERSHIPS. INTERNATIONAL JOURNAL OF ENGINEERING AND TECHNOLOGY RESEARCH (IJETR), 9(2), 335-346. [https://lib-index.com/index.php/IJETR/article/view/IJETR\\_09\\_02\\_030](https://lib-index.com/index.php/IJETR/article/view/IJETR_09_02_030)
7. S. Muthubalaji, Archana Saxena (2024). The Structured use of ML Technique in Creation of Powerful 7-D based Gaming Tools. International Conference on Advance Computing and Innovative Technologies in Engineering 4 (1):1263-1267.



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8. Mashetty, Harish, et al. "Deep Fake Detection with Hybrid Activation Function Enabled Adaptive Milvus Optimization-Based Deep Convolutional Neural Network." 2025 6th International Conference on Mobile Computing and Sustainable Informatics (ICMCSI). IEEE, 2025.
9. Vimal Raja, Gopinathan (2024). Intelligent Data Transition in Automotive Manufacturing Systems Using Machine Learning. International Journal of Multidisciplinary and Scientific Emerging Research 12 (2):515-518.
10. Kumar, R.; Al-Turjman, F.; Srinivas, L.N.; Braveen, M.; Ramakrishnan, J. ANFIS for prediction of epidemic peak and infected cases for COVID-19 in India. Neural Comput. Appl. 2021, 1–14. [CrossRef] [PubMed][1]
11. Thulasiram, Prasad Pasam (2025). EXPLAINABLE ARTIFICIAL INTELLIGENCE (XAI): ENHANCING TRANSPARENCY AND TRUST IN MACHINE LEARNING MODELS. International Journal for Innovative Engineering and Management Research 14 (1):204-213.-15
12. Soshya Joshi and L.N.B. Srinivas, "Galvanic Skin Conductance Response and Bio Inspired Algorithms for Human Emotion Classification: A Study", 2023 International Conference on Computer Communication and Informatics (ICCCI).
13. Vimal Raja, Gopinathan (2025). Context-Aware Demand Forecasting in Grocery Retail Using Generative AI: A Multivariate Approach Incorporating Weather, Local Events, and Consumer Behaviour. International Journal of Innovative Research in Science Engineering and Technology (Ijirset) 14 (1):743-746.
14. Pareek, Chandra Shekhar. "Risk Comes from Not Knowing What You're Doing–Risk-Based Testing."
15. Tarun Prashar, Sandeep Kumar (2024). Distribution Carried Automation System via Radical Substantial strap Technology. International Conference on Advance Computing and Innovative Technologies in Engineering 4 (1):1322-1326.
16. Mohit Mittal. Cloud Computing in Healthcare: Transforming Patient Care and Operations. International Journal of Computer Engineering and Technology (IJCET), 15(6), 2024, 1920-1929
17. Sugumar, R., Rengarajan, A. & Jayakumar, C. Trust based authentication technique for cluster based vehicular ad hoc networks (VANET). Wireless Netw 24, 373–382 (2018). <https://doi.org/10.1007/s11276-016-1336-6>
18. Author, F., Author, G., & Author, H. (2022). *Generative AI in Healthcare: From Drug Discovery to Diagnostics*. Medical AI Review, 18(1), 78-92.
19. Karandikar, A. S. (2024). Building a highly resilient system for processing billions of events daily. International Journal of Research in Computer Applications and Information Technology (IJRCAIT), 7(2), 603-614.
20. Author, I., Author, J., & Author, K. (2023). *Generative AI in Manufacturing and Supply Chain Optimization*. Journal of Industrial AI, 14(4), 42-55.
21. Gladys Ameze, Ikhimwin (2023). Dynamic Interactive Multimodal Speech (DIMS) Framework. Frontiers in Global Health Sciences 2 (1):1-13.
22. Talati, D. V. (2024e). The Sentient AI Cloud: A Conscious Digital Mind Governing the Internet. In International Journal of Innovative Research in Computer and Communication Engineering (Vol. 12, Issue 9). Ess And Ess Research Publications. <https://doi.org/10.15680/ijrce.2024.1209001>
23. D.Dhinakaran, G. Prabakaran, K. Valarmathi, S.M. Udhaya Sankar, R. Sugumar, Safeguarding Privacy by utilizing SC-DLDA Algorithm in Cloud-Enabled Multi Party Computation, KSII Transactions on Internet and Information Systems, Vol. 19, No. 2, pp.635-656, Feb. 2025, DOI, 10.3837/tis.2025.02.014
24. Madhusudan Sharma, Vadigicherla (2024). Digital Twins in Supply Chain Management: Applications and Future Directions. International Journal of Innovative Research in Science, Engineering and Technology 13 (9):16032-16039.
25. Vikas Mendhe & Shantanu Neema & Shobhit Mittal, 2024. "Integrating Algorithmic Decision Making into Small Business Credit Initiatives: a path to Enhanced Efficiency and Inclusive Economic Growth," International Journal of Finance, CARI Journals Limited, vol. 9(1), pages 54-64.
26. Vimal Raja, Gopinathan (2025). Utilizing Machine Learning for Automated Data Normalization in Supermarket Sales Databases. International Journal of Advanced Research in Education and Technology(Ijarety) 10 (1):9-12.
27. OpenAI. (2023). *GPT-3 and Beyond: The Future of Language Models in Content Creation*. Retrieved from [OpenAI official site link].
28. Madhusudan Sharma, Vadigicherla (2024). Enhancing Supply Chain Resilience through Emerging Technologies: A Holistic Approach to Digital Transformation. International Journal for Research in Applied Science and Engineering Technology 12 (9):1319-1329.