Product Description and Predictions Using gemini-1.5-pro

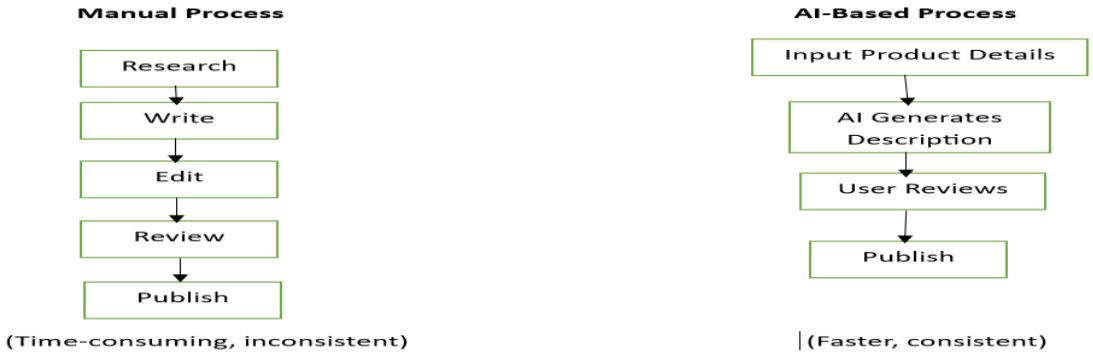
[1]Pavan Gunda,[2]N.V.V.S.Deepthi,[3]K.Bhargav Chowdary,[4]M.Kalyan Ram,[5]P.Anjani Putra
[1]Assistant Professor, Department of Information Technology, Sir C R Reddy College Of Engineering, Eluru, A.P, India
[2,3,4,5]Final Year Students, Department of Information Technology, Sir C R Reddy College Of Engineering, Eluru, A.P, India
Emails:[1] gsraghupavan9@gmail.com , [2] deepthinalam4@gmail.com
[3] bhargavchowdarykosaraju@gmail.com , [4] kalyanrammovva@gmail.com
[5] anjaniputra.palnati7@gmail.com

Abstract
The rapid increase in online shopping has turned it into a requirement for automation technology that improves product discovery, consumer choice, and online shopping experiences. A live price monitoring and product description generation AI-powered system using Google's Gemini AI and SerpAPI is suggested in this paper. The system scrapes real-time prices, reviews, and ratings from multiple online shopping websites and offers consumers accurate comparisons and store suggestions. It leverages natural language processing (NLP) and machine learning to craft compelling, informative, and customer-centric product descriptions. Category verification through AI-assistance prevents misclassification and, therefore, enhances search effectiveness. Both buyers and web traders reap the reward of automated purchasing quality enhancement as well as product information through AI-derived text and dynamic market knowledge. Experimental findings corroborate the efficacy of the system in generating good quality descriptions, along with proper price monitoring, thus basing the system as a highly desirable ingredient to e-commerce society.

Keywords: AI-generated product descriptions, Real-time price tracking, Google Gemini AI, SerpAPI integration, Natural Language Processing (NLP)

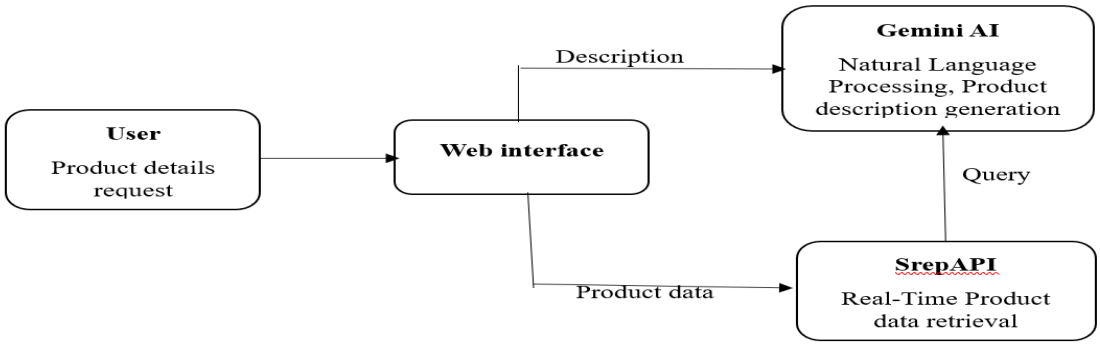
Introduction
Online shopping has transformed the way individuals shop, offering them convenience, choice, and price competitiveness. However, one of the best drawbacks of online shopping is that product descriptions are inconsistent and incomplete. Generic or inadequate descriptions are present for most products, and it becomes difficult for a consumer to make wise buying decisions.
This project demonstrates an AI-driven automated system generating interesting product descriptions and scraping real-time prices, ratings, and reviews from various e-commerce websites. The system employs Google's Gemini AI for NLP to generate interesting and informative product descriptions. It also uses SerpAPI to scrape real-time product data, allowing prices, ratings, and store availability to be compared in an efficient way.

Traditional vs. AI-Based Product Description Writing

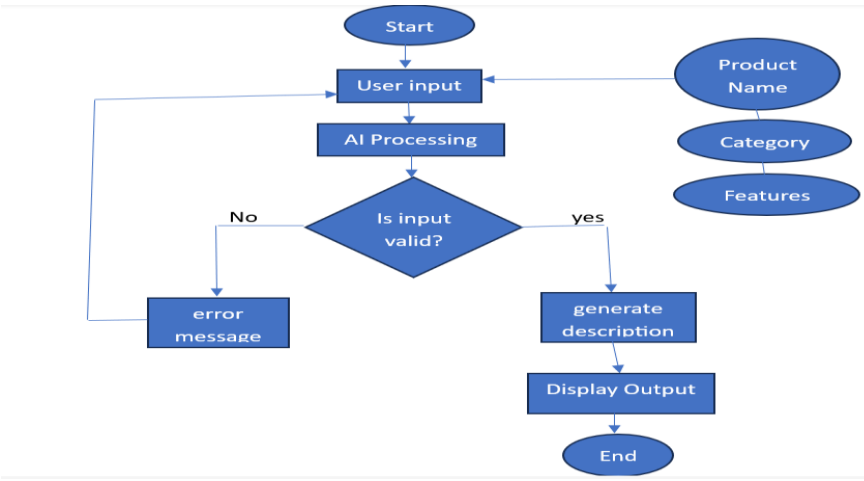


One of the standout features of the system is the way it can verify product categories using AI, ensuring that descriptions are accurate and properly categorized. This removes product categorization errors, which is a common e-commerce website flaw. The system also uses machine learning algorithms to personalize descriptions based on some product features, improving customer interaction and conversion rates.

System Architecture Diagram



Work flow



This AI-driven approach offers significant benefits to both e-commerce businesses and consumers. Online sellers can automate content generation, ensuring consistency and improving search engine rankings, while buyers gain access to well-structured product information and price comparisons, leading to more informed purchasing decisions. The system can also be extended to price monitoring, dynamic pricing strategies, and AI-enhanced marketing, making it a valuable tool in the digital commerce landscape.

Existing System

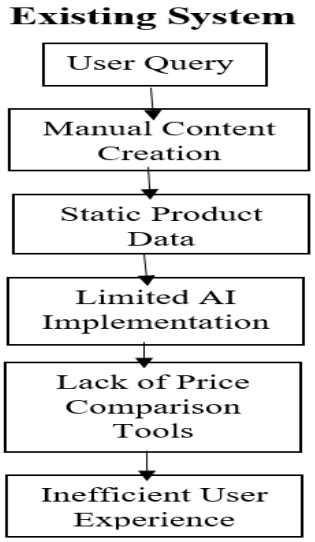
1. Manual Writing of Product Descriptions

Most e-commerce websites utilize human content creation in product descriptions these days. This includes using product managers or content writers who research, write, and SEO-optimize product descriptions. Though this method guarantees human imagination and personalization, it is highly time-consuming, sporadic, and expensive, particularly for businesses that manage a lot of products. Also, human descriptions will likely be non-SEO-optimized, meaning poorer search engine ranking visibility.

2. Template-Based Description Generation

Pre-styled templates are employed by certain web firms where product details (product name, features, specs) are inputted into a pre-styled template. While the process is fast in generating

content, it is fixed and leads to repetitive, generic, and non-interactive copy. Descriptions also do not change based on product categories, and therefore their ability to generate customer interest and conversions is reduced.



Algorithms Used in the Existing System:

1. Rule-Based Text Generation

The current system produces product descriptions based on predefined templates. The templates have a rigid format and are not personalized, which means they are less interesting and SEO-friendly.

2. Simple Price Comparison Algorithm : The system retrieves prices from various platforms and determines the lowest price based on a simple sorting algorithm. It does not consider extra costs such as shipping, discounts, or seller reputation.

Advantages of the Existing System:

- Automates product price comparison, reducing manual effort.
- Simple implementation with rule-based text generation.
- Cost-effective as it does not require AI models.

Disadvantages of the Existing System:

- Lacks personalization in product descriptions.
- Web scraping is unreliable due to website changes and restrictions.

Proposed System

The platform innovation enhances e-commerce product description creation and price monitoring using artificial intelligence and real-time data collection. Unlike rule-based text creation, the platform utilizes Google Gemini AI to create stable, SEO-optimized descriptions of accurate product features. By using AI, the descriptions are more dynamic, user-focused, and optimized for better customer interaction and conversion.

For real-time monitoring of product prices, the system retrieves new prices, reviews, and ratings from online sources through SerpAPI. Web scraping is not used since SerpAPI provides data in structured form that is not affected by website updates.

What is an API Key

An API key is a unique code used to identify and authenticate a user or application when interacting with an API. It acts like a password that gives secure and

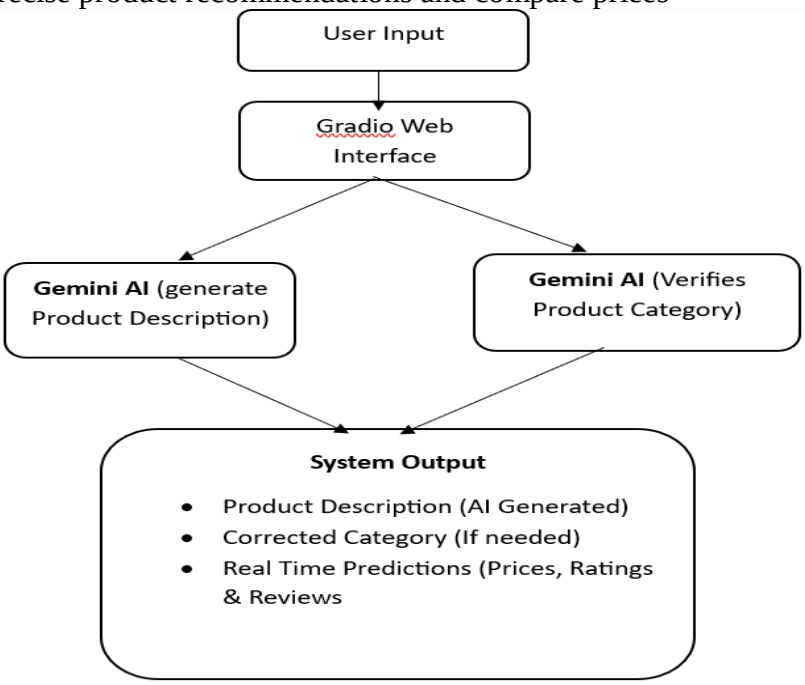
Types of API Keys

1. Public API Keys
   Used in client-side applications. They offer limited access and are not suitable for sensitive operations.

2. Private API Keys
   Used in server-side applications. They provide full access and are kept secure from the public.

Why SerpAPI Key is Used in This Project

SerpAPI key is required in this project to scrape information from Google shopping. It helps the system to retrieve the product's current price, rating, review, and seller. This helps the tool to return the most precise product recommendations and compare prices



Algorithms Used in the Proposed System:

1.NLG Algorithm

- Typed in to create product descriptions using the assistance of Google Gemini AI.
- Accepts the product name, category, and main features as input parameters.

2.Product Ranking Algorithm

- Fetches similar information about a product from SerpAPI (Google Shopping results).
- Retrieves chosen and ranked products based on rating and reviews.

best_product = max(results, key=lambda p: (p["rating"], p["reviews"]))

3.Category Verification Algorithm

- Takes Gemini AI to verifying product categories.
- Re-checks between category suggested by AI and user-entry category.

4.Real-Time Product Price Retrieval Algorithm

- Invokes SerpAPI API to obtain real-time prices.
- Obtains product details by parsing the JSON response.

Advantages

• Gives accurate product comparisons to make well-informed choices.
• Automatically tracks prices and creates descriptions.

Drawbacks

• Requires SerpAPI and Gemini AI for External API Reliance.
• Possible Inconsistencies in Data – Prices and reviews continuously change.

Methodology:

1.User Input Collection

- Users enter product name, category, and key features via a Gradio UI.

2.Product Description Generation

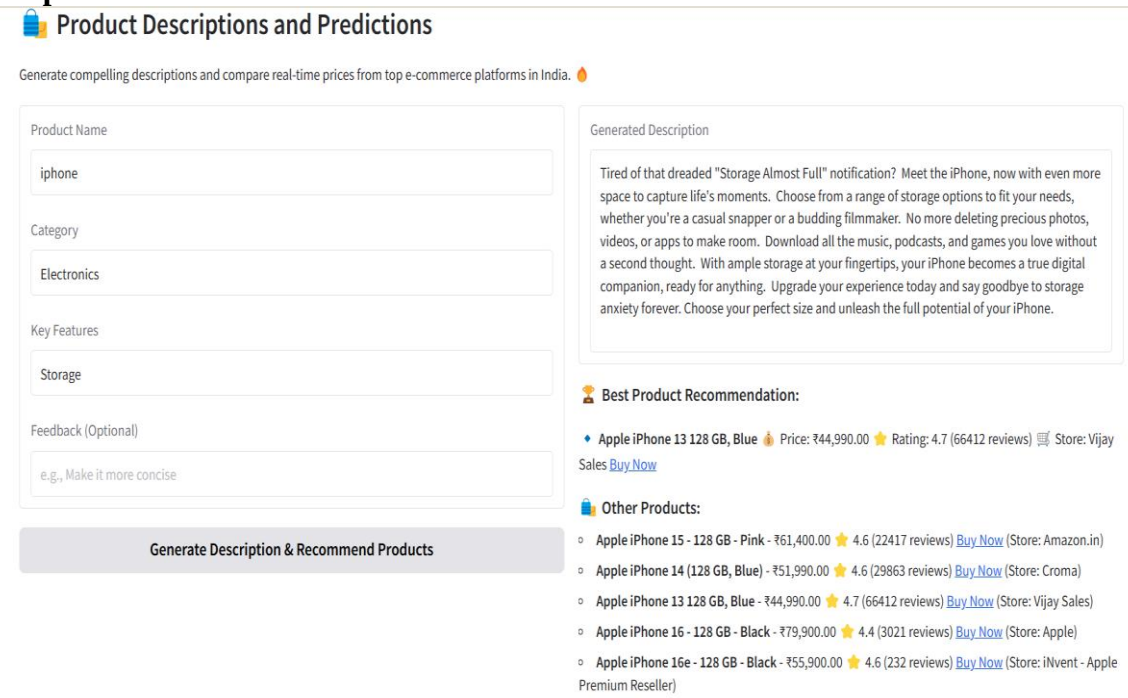
- Google Gemini AI generates an engaging and SEO-friendly product description.
- If necessary, AI verifies and suggests a correct product category.

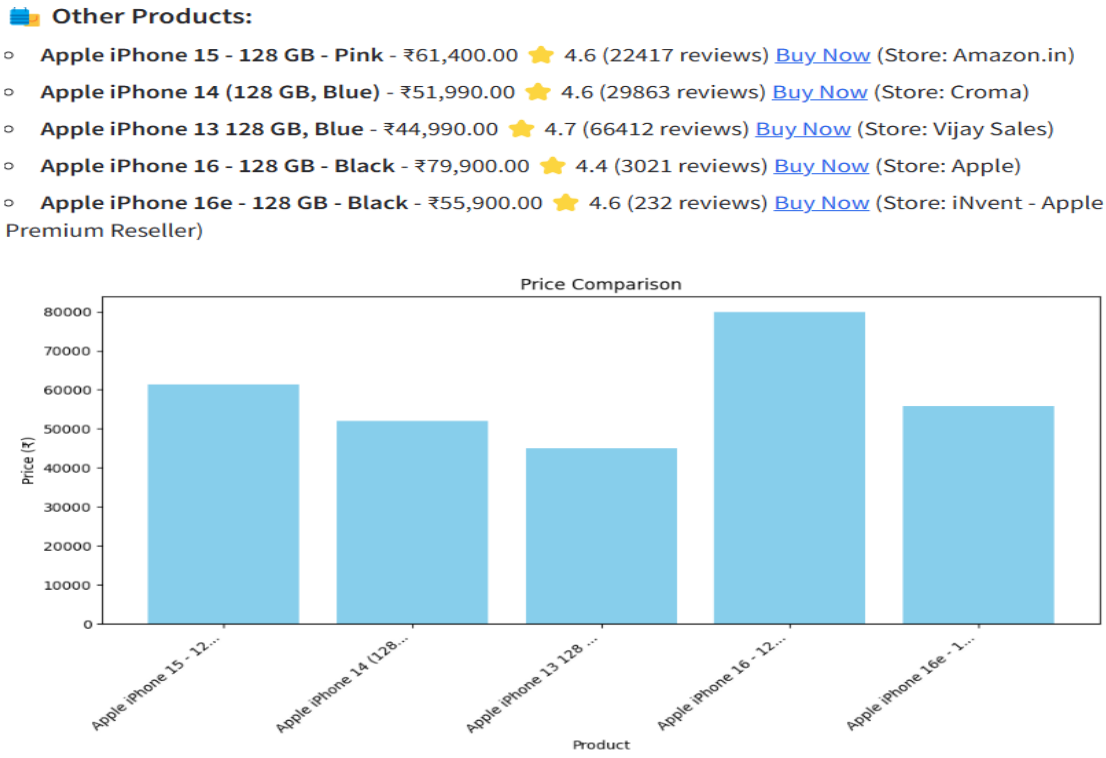
3.Real-Time Product Data Retrieval

- SerpAPI fetches live product details, including price, store, ratings, and reviews.
- The system ranks products based on ratings and reviews.

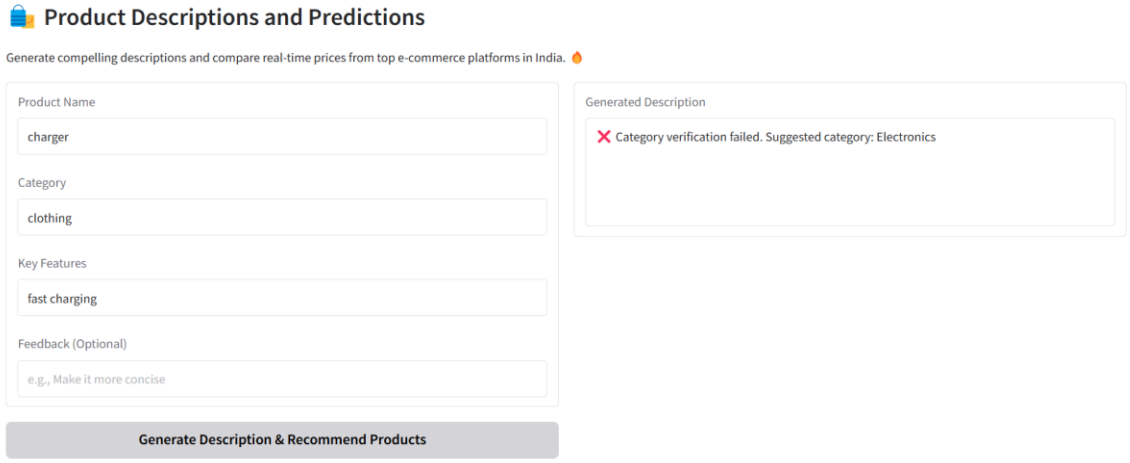
Results and discussions

Output-1

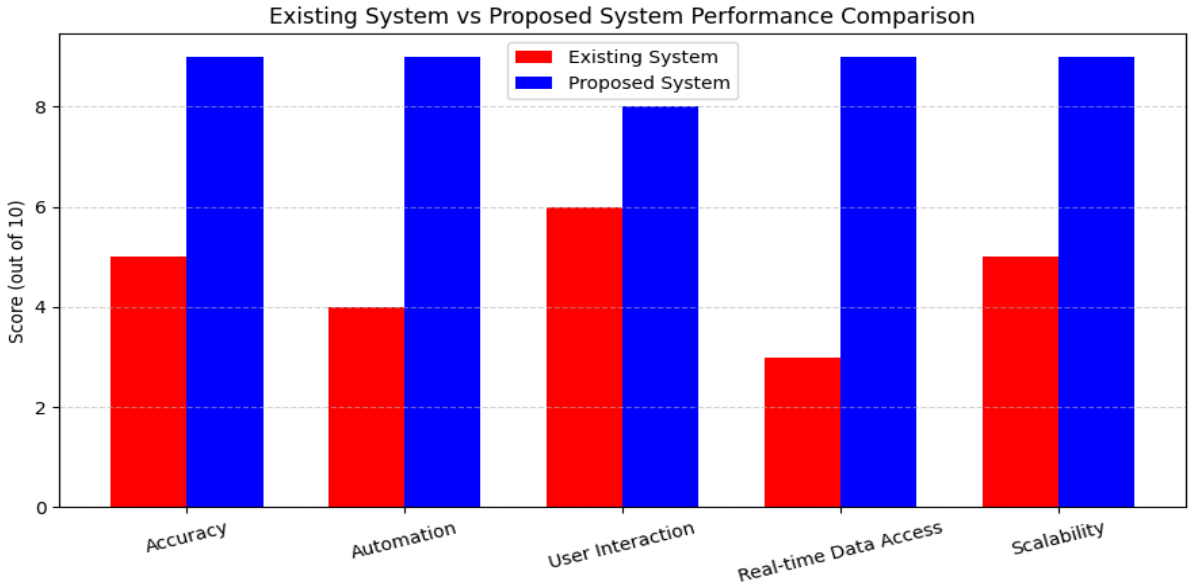




Output-3



a **graph comparison** between the **existing system** and **proposed system**, we can compare key performance metrics such as:



Conclusion

The suggested AI-enabled system efficiently performs product description generation and real-time price monitoring for online retailers. With Google Gemini AI integration, it offers superior-quality, interactive, and search engine-optimized descriptions, while SerpAPI offers accurate price comparisons among online retailers.Additionally, AI-based category confirmation reduces misclassification errors. Relative to best practices, the system has much to gain in terms of efficiency, accuracy, and customer engagement. Future enhancements could involve better platform support, better quality AI-generated descriptions, and more sophisticated price forecasting models. Overall, the solution offers a scalable, intelligent, and efficient means of automating e-commerce product descriptions and prices.

References:

1. Brown, T., Mann, B., Ryder, N., et al. (2020). "Language Models are Few-Shot Learners." *Advances in Neural Information Processing Systems (NeurIPS)*.

2. P. Gunda and T. R. Komati, "Enhancing User Experience and Mitigating BIAS in Electronic Device Recommendations on e-Commerce Platforms: Leveraging NLP and GPT Technologies," 2024 4th International Conference on Sustainable Expert Systems (ICSES), Kaski, Nepal, 2024, pp. 149-156, doi: 10.1109/ICSES63445.2024.10763266.
3. Google AI. (2024). "Gemini AI: Advanced Generative Language Model." Retrieved from https://ai.google/
4. GUNDA, P., & Thirupathi Rao KOMATI. (2024). Integrating Self-Attention Mechanisms For Contextually Relevant Information In Product Management. International Journal of Computational and Experimental Science and Engineering, 10(4). https://doi.org/10.22399/ijcesen.651
5. SerpAPI. (2024). "Google Shopping API for Real-Time Product Data." Retrieved from https://serpapi.com/
6. B. R. Babu, S. Ramakrishna and S. K. Duvvuri, "Advanced Sentiment and Trend Analysis of Twitter Data Using CNN-LSTM and Word2Vec," 2025 4th International Conference on Sentiment Analysis and Deep Learning (ICSADL), Bhimdatta, Nepal, 2025, pp. 1536-1543, doi: 10.1109/ICSADL65848.2025.10933031.
7. Vaswani, A., Shazeer, N., Parmar, N., et al. (2017). "Attention is All You Need." *Advances in Neural Information Processing Systems (NeurIPS)*.
8. BABU, B. R., & RAMAKRISHNA, S. (2024). EVOLVING INTERESTS AND PREFERENCES USING ARIMA AND STL IN SOCIAL MEDIA SEARCH BEHAVIORS. Journal of Theoretical and Applied Information Technology, 102(22).
9. OpenAI. (2023). "Generative AI for E-Commerce: Applications and Best Practices." Retrieved from https://openai.com/
10. Liu, Y., Ott, M., Goyal, N., et al. (2019). "RoBERTa: A Robustly Optimized BERT Pretraining Approach." *arXiv preprint arXiv:1907.11692*.
11. Devlin, J., Chang, M.-W., Lee, K., & Toutanova, K. (2019). "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." *Proceedings of NAACL-HLT 2019*.
12. Venkata Kishore Kumar Rejeti, DR.G.Murali, "A Survey on the Present State-of-the-Art of Explosives, Detection Methods and Automatic Explosive Detection using Wireless Sensor Network", International Journal of Applied Engineering Research ISSN 0973-4562 Volume 11, Number 1 (2016) pp 504-510, Research India Publications. https://dx.doi.org/10.37622/IJAER/11.1.2016.504-510504.
13. Venkata Kishore Kumar Rejeti, DR.G.Murali, G.Manthru Naik, "Wireless Nano Senor Network (WNSN) for Trace Detection of Explosives: The Case of RDX and TNT", Instrumentation, Mesures, Métrologies . Apr2019, Vol. 18 Issue 2, p153-158.
14. Dr.Venkata Kishore Kumar Rejeti, "Effective Routing Protocol in Mobile ADHOC Network Using Individual Node Energy", International Journal Advanced Research Engineering a Technology (IJARET), Volume 12, Issue 2, February 2021, pp.445-453, ISSN Print: 0976-6480 and ISSN Online: 0976-6499, DOI: 10.34218/IJARET.12.2.2020.042.