Interactive Web Application for Intellectual Property Awareness Among School Students

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ABSTRACT. The lack of intellectual property (IP) awareness among school students is a pressing concern in today's digital age. With the increasing importance of innovation and creativity, understanding intellectual property rights (IPR) at an early age is critical for fostering an informed generation. This paper presents the development of an interactive web application that educates school students about various aspects of IPR. The platform includes a series of educational modules, quizzes, and interactive features designed to engage students in learning. This project highlights the growing need for early IPR education and provides a scalable, accessible solution for schools. The primary aim of the project is to create awareness and provide resources to help students understand the importance of intellectual property in safeguarding their innovations. The application also includes administrative functionalities for tracking student progress, offering a holistic learning experience.

Keywords. Intellectual Property, Gamification, Web Application, Education, School Students

1. INTRODUCTION

Intellectual property rights are crucial in protecting creations of the mind, such as inventions, literary works, designs, and symbols. Despite the importance of these rights, IP awareness remains low, especially among school students. This knowledge gap can lead to misuse or lack of protection for creative works. As innovation becomes a key driver of the global economy, it is essential to educate young minds about intellectual property and its implications.

The objective of this research is to develop a web application that introduces school students to the fundamentals of IPR in a simplified, engaging manner. Current approaches to teaching IPR are often restricted to higher education and industry professionals, leaving young students uninformed. The proposed platform fills this gap by offering interactive lessons, quizzes, and practical examples designed for school-level learners.

By integrating technology into education, this web application supports schools in delivering essential knowledge on intellectual property. It caters to both students and educators, offering modules on copyright, trademarks, patents, and design rights. Additionally, the platform includes administrative tools for teachers to track students' progress, ensuring a comprehensive learning environment.

2. RESEARCH METHODOLOGY

The project followed a structured software development lifecycle, beginning with a needs analysis to identify the key areas of intellectual property that students should learn. The research identified four primary categories of intellectual property: copyrights, trademarks, patents, and design rights. These categories were selected for their relevance to everyday creative processes that students might engage in, such as writing, creating artwork, or inventing new products.

The web application was developed using HTML, CSS, JavaScript, and SQL, providing a user- friendly interface that is both accessible and intuitive for students. The front-end of the application was designed to be visually engaging, with interactive elements that encourage active participation. The back-end manages user data, tracks student performance, and stores quiz results for review by teachers and administrators.

The quizzes are dynamically generated from a question bank to ensure variety and a comprehensive assessment of the student's understanding. Each quiz is tailored to cover a wide range of topics related to intellectual property, ensuring that students are tested on different aspects during multiple attempts.

Feedback was collected from both students and teachers, which was essential in refining the user interface, adjusting the difficulty of quiz questions, and improving the overall content structure. The system was designed to scale for larger groups, ensuring it can be easily adopted by educational institutions.

3. THEORY AND CALCULATION

The theoretical foundation for this project is based on cognitive learning theory, which emphasizes the role of interactive, engaging content in facilitating knowledge retention. Students are more likely to understand and remember complex concepts, such as intellectual property rights, when they can actively engage with the material through quizzes and scenarios.

The calculation of resources focused on designing a platform that would be scalable and adaptable for different educational settings. Given that the platform is aimed at schools with varying levels of technological infrastructure, the application was designed to function smoothly on devices with limited processing power and internet bandwidth.

The content for the quizzes and modules was reviewed by experts in intellectual property law to ensure that the information was accurate and up to date. Additionally, the quiz algorithm was designed to randomly select questions from a large question bank, ensuring that each user has a unique learning experience that tests a comprehensive range of IPR topics.

4. RESULTS AND DISCUSSION

Feedback from initial testing indicated that students found the platform easy to use and engaging.

Teachers also reported that the content was relevant and aligned with educational goals. One of the key strengths of the platform is its ability to present complex legal concepts in a format that young students can easily understand. The interactive quizzes, in particular, helped reinforce learning by providing immediate feedback and explanations for incorrect answers.The platform's administrative features, which allow teachers to track the progress of their students, were well received. These tools enable educators to assess how well students are

grasping the material and identify areas where additional focus might be needed. The ability to monitor quiz results over time allows for tailored instruction and the identification of common areas of misunderstanding among students.

Furthermore, the inclusion of real-world case studies provided students with a practical understanding of intellectual property rights. These case studies illustrated the importance of protecting one's creations and the potential consequences of failing to do so. For example, a case involving a famous copyright infringement highlighted the legal ramifications of unauthorized use of creative works.

4.1 Preparation of Figures and Tables

The following table illustrates the main features and their implementation within the platform

Feature	Description
Interactive Learning Modules	Engaging lessons on copyright, patents, trademarks, etc.
Quiz Feature	Assessments with feedback to reinforce learning
Administrative Tools	Tracking and progress monitoring for teachers
Scalability	Designed to function on low-spec devices and varying bandwidths

5. CONCLUSIONS

The development of the interactive web application for intellectual property awareness among school students marks a significant step forward in education technology. By simplifying complex legal concepts and making them accessible to young learners, the platform addresses a critical gap in the current education system. The integration of quizzes and interactive lessons has proven effective in engaging students and reinforcing their understanding of IPR.

The initial response from both students and educators has been overwhelmingly positive, with many expressing interest in adopting the platform for regular classroom use. Future iterations of the platform will aim to incorporate additional content areas, as well as improve the scalability of the system for use in larger educational settings.

In conclusion, this project demonstrates the potential for technology to enhance learning and raise awareness about intellectual property among school students. With further development, the platform could become an essential tool for educating the next generation of innovators about their legal rights.

Furthermore, this platform has the potential to impact not only students but also educators by integrating IP education into school curricula, fostering innovation and respect for creativity. Its scalable design allows adaptation to various educational contexts, from small classrooms to large institutions. Future developments could include multilingual support and updated content to align with evolving IP laws, enhancing its effectiveness. Through these advancements, the platform could become a global model for teaching intellectual property in schools, promoting early awareness of legal rights and creative protection.

6. DECLARATIONS

6.1 Study Limitations:

None

6.2 Acknowledgements:

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6.3 Funding Source:

None

6.4 Competing Interests:

None

REFERENCES

1. Mukiri, R. R., Kumar, B. S., & Prasad, B. V. V. (2019, February). Effective Data Collaborative Strain Using RecTree Algorithm. In *Proceedings of International Conference on Sustainable Computing in Science, Technology and Management (SUSCOM), Amity University Rajasthan, Jaipur-India*.
2. Rao, B. T., Prasad, B. V. V. S., & Peram, S. R. (2019). Elegant Energy Competent Lighting in Green Buildings Based on Energetic Power Control Using IoT Design. In *Smart Intelligent Computing and Applications: Proceedings of the Second International Conference on SCI 2018, Volume 1* (pp. 247-257). Springer Singapore.
3. Someswar, G. M., & Prasad, B. V. V. S. (2017, October). USVGM protocol with two layer architecture for efficient network management in MANET'S. In *2017 2nd International Conference on Communication and Electronics Systems (ICCES)* (pp. 738-741). IEEE.
4. Alapati, N., Prasad, B. V. V. S., Sharma, A., Kumari, G. R. P., Veeneetha, S. V., Srivalli, N., ... & Sahitya, D. (2022, November). Prediction of Flight-fare using machine learning. In *2022 International Conference on Fourth Industrial Revolution Based Technology and Practices (ICFIRTP)* (pp. 134-138). IEEE.
5. Alapati, N., Prasad, B. V. V. S., Sharma, A., Kumari, G. R. P., Bhargavi, P. J., Alekhya, A., ... & Nandini, K. (2022, November). Cardiovascular Disease Prediction using machine learning. In *2022 International Conference on Fourth Industrial Revolution Based Technology and Practices (ICFIRTP)* (pp. 60-66). IEEE.
6. Narayana, M. S., Babu, N., Prasad, B. V. V. S., & Kumar, B. S. (2011). Clustering Categorical Data--Study of Mining Tools for Data Labeling. *International Journal of Advanced Research in Computer Science*, *2*(4).
7. Shankar, G. S., Onyema, E. M., Kavin, B. P., Gude, V., & Prasad, B. S. (2024). Breast Cancer Diagnosis Using Virtualization and Extreme Learning Algorithm Based on Deep Feed Forward Networks. *Biomedical Engineering and Computational Biology*, *15*, 11795972241278907.
8. Kulkarni, R., & Prasad, B. S. (2022). Predictive Modeling Of Heart Disease Using Artificial Intelligence. *Journal of Survey in Fisheries Sciences*, 791-801.
9. Gowda, B. M. V., Murthy, G. V. K., Upadhye, A. S., & Raghavan, R. (1996). Serotypes of Escherichia coli from pathological conditions in poultry and their antibiogram.
10. Balasubbareddy, M., Murthy, G. V. K., & Kumar, K. S. (2021). Performance evaluation of different structures of power system stabilizers. *International Journal of Electrical and Computer Engineering (IJECE)*, *11*(1), 114-123.
11. Murthy, G. V. K., & Sivanagaraju, S. (2012). S. Satyana rayana, B. Hanumantha Rao," Voltage stability index of radial distribution networks with distributed generation,". *Int. J. Electr. Eng*, *5*(6), 791-803.
12. Anuja, P. S., Kiran, V. U., Kalavathi, C., Murthy, G. N., & Kumari, G. S. (2015). Design of elliptical patch antenna with single & double U-slot for wireless applications: a comparative approach. *International Journal of Computer Science and Network Security (IJCSNS)*, *15*(2), 60.
13. Murthy, G. V. K., Sivanagaraju, S., Satyanarayana, S., & Rao, B. H. (2015). Voltage stability enhancement of distribution system using network reconfiguration in the presence of DG. *Distributed Generation & Alternative Energy Journal*, *30*(4), 37-54.
14. 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.
15. Madhavi, M., & Murthy, G. V. (2020). Role of certifications in improving the quality of Education in Outcome Based Education. *Journal of Engineering Education Transformations*, *33*(Special Issue).
16. Varaprasad Rao, M., Srujan Raju, K., Vishnu Murthy, G., & Kavitha Rani, B. (2020). Configure and management of internet of things. In *Data Engineering and Communication Technology: Proceedings of 3rd ICDECT-2K19* (pp. 163-172). Springer Singapore.

17. Murthy, G. V. K., Suresh, C. H. V., Sowjankumar, K., & Hanumantharao, B. (2019). Impact of distributed generation on unbalanced radial distribution system. *International Journal of Scientific and Technology Research*, *8*(9), 539-542.
18. 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).
19. Balram, G., & Kumar, K. K. (2018). Smart farming: Disease detection in crops. *Int. J. Eng. Technol*, *7*(2.7), 33-36.
20. Balram, G., Rani, G. R., Mansour, S. Y., & Jafar, A. M. (2001). Medical management of otitis media with effusion. *Kuwait Medical Journal*, *33*(4), 317-319.
21. 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.
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. Prasad, P. S., & Rao, S. K. M. (2017). HIASA: Hybrid improved artificial bee colony and simulated annealing based attack detection algorithm in mobile ad-hoc networks (MANETs). *Bonfring International Journal of Industrial Engineering and Management Science*, *7*(2), 01-12.
24. Prasad, PVS Siva, and S. Krishna Mohan Rao. "A Survey on Performance Analysis of ManetsUnder Security Attacks." *network* 6, no. 7 (2017).
25. 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*.
26. 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*(Special Issue).
27. Reddy, P. R. S., & Ravindranadh, K. (2019). An exploration on privacy concerned secured data sharing techniques in cloud. *International Journal of Innovative Technology and Exploring Engineering*, *9*(1), 1190-1198.
28. 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).
29. 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.
30. Kovoor, 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.
31. Rao, N. R., Kovoor, 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 S).
32. Madhuri, K. (2023). Security Threats and Detection Mechanisms in Machine Learning. *Handbook of Artificial Intelligence*, 255.
33. 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.
34. DASTAGIRAIAH, 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).
35. Sukhavasi, V., Kulkarni, S., Raghavendran, V., Dastagiraiah, C., Apat, S. K., & Reddy, P. C. S. (2024). Malignancy Detection in Lung and Colon Histopathology Images by Transfer Learning with Class Selective Image Processing.
36. 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 (IJEEI)*, *12*(3), 640-649.
37. 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.
38. 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.

39. Sravan, K., Gunakar Rao, L., Ramineni, K., Rachapalli, A., & Mohmmad, S. (2023, July). Analyze the Quality of Wine Based on Machine Learning Approach. In *International Conference on Data Science and Applications* (pp. 351-360). Singapore: Springer Nature Singapore.
40. LAASSIRI, J., EL HAJJI, S. A. Ï. D., BOUHDADI, M., AOUDE, M. A., JAGADISH, H. P., LOHIT, M. K., ... & KHOLLADI, M. (2010). Specifying Behavioral Concepts by engineering language of RM-ODP. *Journal of Theoretical and Applied Information Technology*, *15*(1).
41. Ramineni, K., Harshith Reddy, K., Sai Thrikoteshwara Chary, L., Nikhil, L., & Akanksha, P. (2024, February). Designing an Intelligent Chatbot with Deep Learning: Leveraging FNN Algorithm for Conversational Agents to Improve the Chatbot Performance. In *World Conference on Artificial Intelligence: Advances and Applications* (pp. 143-151). Singapore: Springer Nature Singapore.
42. Samya, B., Archana, M., Ramana, T. V., Raju, K. B., & Ramineni, K. (2024, February). Automated Student Assignment Evaluation Based on Information Retrieval and Statistical Techniques. In *Congress on Control, Robotics, and Mechatronics* (pp. 157-167). Singapore: Springer Nature Singapore.
43. Sekhar, P. R., & Sujatha, B. (2020, July). A literature review on feature selection using evolutionary algorithms. In *2020 7th International Conference on Smart Structures and Systems (ICSSS)* (pp. 1-8). IEEE.
44. Sekhar, P. R., & Sujatha, B. (2023). Feature extraction and independent subset generation using genetic algorithm for improved classification. *Int. J. Intell. Syst. Appl. Eng*, *11*, 503-512.
45. Sekhar, P. R., & Goud, S. (2024). Collaborative Learning Techniques in Python Programming: A Case Study with CSE Students at Anurag University. *Journal of Engineering Education Transformations*, *38*(Special Issue 1).
46. Pesaramelli, R. S., & Sujatha, B. (2024, March). Principle correlated feature extraction using differential evolution for improved classification. In *AIP Conference Proceedings* (Vol. 2919, No. 1). AIP Publishing.
47. Amarnadh, V., & Moparthi, N. R. (2023). Comprehensive review of different artificial intelligence-based methods for credit risk assessment in data science. *Intelligent Decision Technologies*, *17*(4), 1265-1282.
48. Amarnadh, V., & Moparthi, N. R. (2024). Prediction and assessment of credit risk using an adaptive Binarized spiking marine predators' neural network in financial sector. *Multimedia Tools and Applications*, *83*(16), 48761-48797.
49. Amarnadh, V., & Moparthi, N. R. (2024). Range control-based class imbalance and optimized granular elastic net regression feature selection for credit risk assessment. *Knowledge and Information Systems*, 1-30.
50. Amarnadh, V., & Akhila, M. (2019, May). RETRACTED: Big Data Analytics in E-Commerce User Interest Patterns. In *Journal of Physics: Conference Series* (Vol. 1228, No. 1, p. 012052). IOP Publishing.
51. Ravinder Reddy, B., & Anil Kumar, A. (2020). Survey on access control mechanisms in cloud environments. In *Advances in Computational Intelligence and Informatics: Proceedings of ICACII 2019* (pp. 141-149). Springer Singapore.
52. Reddy, M. B. R., Nandini, J., & Sathwik, P. S. Y. (2019). Handwritten text recognition and digital text conversion. *International Journal of Trend in Research and Development*, *3*(3), 1826-1827.
53. Reddy, B. R., & Adilakshmi, T. (2023). Proof-of-Work for Merkle based Access Tree in Patient Centric Data. *structure*, *14*(1).
54. Reddy, B. R., Adilakshmi, T., & Kumar, C. P. (2020). Access Control Methods in Cloud Enabledthe Cloud-Enabled Internet of Things. In *Managing Security Services in Heterogenous Networks* (pp. 1-17). CRC Press.
55. Reddy, M. B. R., Akhil, V., Preetham, G. S., & Poojitha, P. S. (2019). Profile Identification through Face Recognition.
56. Dutta, P. K., & Mitra, S. (2021). Application of agricultural drones and IoT to understand food supply chain during post COVID-19. *Agricultural informatics: automation using the IoT and machine learning*, 67-87.
57. Matuka, A., Asafo, S. S., Eweke, G. O., Mishra, P., Ray, S., Abotaleb, M., ... & Chowdhury, S. (2022, December). Analysing the impact of COVID-19 outbreak and economic policy uncertainty on stock markets in major affected economies. In *6th Smart Cities Symposium (SCS 2022)* (Vol. 2022, pp. 372-378). IET.
58. Saber, M., & Dutta, P. K. (2022). Uniform and Nonuniform Filter Banks Design Based on Fusion Optimization. *Fusion: Practice and Applications*, *9*(1), 29-37.
59. Mensah, G. B., & Dutta, P. K. (2024). Evaluating if Ghana's Health Institutions and Facilities Act 2011 (Act 829) Sufficiently Addresses Medical Negligence Risks from Integration of Artificial Intelligence Systems. *Mesopotamian Journal of Artificial Intelligence in Healthcare*, *2024*, 35-41.
60. Aydın, Ö., Karaarslan, E., & Gökçe Narin, N. (2023). Artificial intelligence, vr, ar and metaverse technologies for human resources management. *VR, AR and Metaverse Technologies for Human Resources Management (June 15, 2023)*.
61. Thamma, S. R. (2025). Transforming E-Commerce with Pragmatic Advertising Using Machine Learning Techniques.

62. Thamma, S. R. T. S. R. (2024). Optimization of Generative AI Costs in Multi-Agent and Multi-Cloud Systems.
63. Thamma, S. R. T. S. R. (2024). Revolutionizing Healthcare: Spatial Computing Meets Generative AI.
64. Thamma, S. R. T. S. R. (2024). Cardiovascular image analysis: AI can analyze heart images to assess cardiovascular health and identify potential risks.
65. Thamma, S. R. T. S. R. (2024). Generative AI in Graph-Based Spatial Computing: Techniques and Use Cases.
66. Harinath, D., Bandi, M., Patil, A., Murthy, M. R., & Raju, A. V. S. (2024). Enhanced Data Security and Privacy in IoT devices using Blockchain Technology and Quantum Cryptography. *Journal of Systems Engineering and Electronics (ISSN NO: 1671-1793)*, *34*(6).
67. Harinath, D., Patil, A., Bandi, M., Raju, A. V. S., Murthy, M. R., & Spandana, D. (2024). Smart Farming System–An Efficient technique by Predicting Agriculture Yields Based on Machine Learning. *Technische Sicherheit (Technical Security) Journal*, *24*(5), 82-88.
68. Masimukku, A. K., Bandi, M., Vallu, S., Patil, A., Vasundhara, K. L., & Murthy, M. R. (2025). Innovative Approaches in Diabetes Management: Leveraging Technology for Improved Healthcare Outcomes. *International Meridian Journal*, *7*(7).
69. Bandi, M., Masimukku, A. K., Vemula, R., & Vallu, S. (2024). Predictive Analytics in Healthcare: Enhancing Patient Outcomes through Data-Driven Forecasting and Decision-Making. *International Numeric Journal of Machine Learning and Robots*, *8*(8), 1-20.
70. Moreb, M., Mohammed, T. A., & Bayat, O. (2020). A novel software engineering approach toward using machine learning for improving the efficiency of health systems. *IEEE Access*, *8*, 23169-23178.
71. Ravi, P., Batta, G. S. H. N., & Yaseen, S. (2019). Toxic comment classification. *International Journal of Trend in Scientific Research and Development (IJTSRD)*.
72. Pallam, R., Konda, S. P., Manthripragada, L., & Noone, R. A. (2021). Detection of Web Attacks using Ensemble Learning. *learning*, *3*(4), 5.
73. Reddy, P. V., Ravi, P., Ganesh, D., Naidu, P. M. K., Vineeth, N., & Sameer, S. (2023, July). Detection and Evaluation of Cervical Cancer by Multiple Instance Learning. In *2023 2nd International Conference on Edge Computing and Applications (ICECAA)* (pp. 627-633). IEEE.
74. Ravi, P., Haritha, D., & Niranjan, P. (2018). A Survey: Computing Iceberg Queries. *International Journal of Engineering & Technology*, *7*(2.7), 791-793.
75. Chidambaram, R., Balamurugan, M., Senthilkumar, R., Srinivasan, T., Rajmohan, M., Karthick, R., & Abraham, S. (2013). Combining AIET with chemotherapy–lessons learnt from our experience. *J Stem Cells Regen Med*, *9*(2), 42-43.
76. Karthick, R., & Sundhararajan, M. (2014). Hardware Evaluation of Second Round SHA-3 Candidates Using FPGA. *International Journal of Advanced Research in Computer Science & Technology (IJARCST 2014)*, *2*(2).
77. Sudhan, K., Deepak, S., & Karthick, R. (2016). SUSTAINABILITY ANALYSIS OF KEVLAR AND BANANA FIBER COMPOSITE.
78. Karthick, R., Gopalakrishnan, S., & Ramesh, C. (2020). Mechanical Properties and Characterization of Palmyra Fiber and Polyester Resins Composite. *International Journal of Emerging Trends in Science & Technology*, *6*(2).
79. Karthick, R., Pandi, M., Dawood, M. S., Prabaharan, A. M., & Selvaprasanth, P. (2021). ADHAAR: A RELIABLE DATA HIDING TECHNIQUES WITH (NNP2) ALGORITHMIC APPROACH USING X-RAY IMAGES. *3C Tecnologia*, 597-608.
80. Deepa, R., Karthick, R., Velusamy, J., & Senthilkumar, R. (2025). Performance analysis of multiple-input multiple-output orthogonal frequency division multiplexing system using arithmetic optimization algorithm. *Computer Standards & Interfaces*, *92*, 103934.
81. Selvan, M. Arul, and S. Miruna Joe Amali. "RAINFALL DETECTION USING DEEP LEARNING TECHNIQUE." (2024).
82. Selvan, M. Arul. "Fire Management System For Indutrial Safety Applications." (2023).
83. Selvan, M. A. (2023). A PBL REPORT FOR CONTAINMENT ZONE ALERTING APPLICATION.
84. Selvan, M. A. (2023). CONTAINMENT ZONE ALERTING APPLICATION A PROJECT BASED LEARNING REPORT.
85. Selvan, M. A. (2021). Robust Cyber Attack Detection with Support Vector Machines: Tackling Both Established and Novel Threats.
86. Reddy, A. S., Prathap, P., Subbaiah, Y. V., Reddy, K. R., & Yi, J. (2008). Growth and physical behaviour of Zn1− xMgxO films. *Thin Solid Films*, *516*(20), 7084-7087.
87. Ambujam, S., Audhya, M., Reddy, A., & Roy, S. (2013). Cutaneous angiosarcoma of the head, neck, and face of the elderly in type 5 skin. *Journal of Cutaneous and Aesthetic Surgery*, *6*(1), 45-47.

88. Reddy, K. R., Prathap, P., Revathi, N., Reddy, A. S. N., & Miles, R. W. (2009). Mg-composition induced effects on the physical behavior of sprayed Zn1− xMgxO films. *Thin Solid Films*, *518*(4), 1275-1278.
89. Prathap, P., Reddy, A. S., Reddy, G. R., Miles, R. W., & Reddy, K. R. (2010). Characterization of novel sprayed Zn1− xMgxO films for photovoltaic application. *Solar energy materials and solar cells*, *94*(9), 1434-1436.
90. Babbar, R., Kaur, A., Vanya, Arora, R., Gupta, J. K., Wal, P., ... & Behl, T. (2024). Impact of Bioactive Compounds in the Management of Various Inflammatory Diseases. *Current Pharmaceutical Design*, *30*(24), 1880-1893.
91. Lokhande, M., Kalpanadevi, D., Kate, V., Tripathi, A. K., & Bethapudi, P. (2023). Study of Computer Vision Applications in Healthcare Industry 4.0. In *Healthcare Industry 4.0* (pp. 151-166). CRC Press.
92. Parganiha, R., Tripathi, A., Prathyusha, S., Baghel, P., Lanjhiyana, S., Lanjhiyana, S., ... & Sarkar, D. (2022). A review of plants for hepatic disorders. *J. Complement. Med. Res*, *13*(46), 10-5455.
93. Tripathi, A. K., Soni, R., & Verma, S. (2022). A review on ethnopharmacological applications, pharmacological activities, and bioactive compounds of Mimosa pudica (linn.). *Research Journal of Pharmacy and Technology*, *15*(9), 4293-4299.
94. Tripathi, A. K., Dwivedi, C. P., Bansal, P., Pradhan, D. K., Parganiha, R., & Sahu, D. An Ethnoveterinary Important Plant Terminalia Arjuna. *International Journal of Health Sciences*, (II), 10601-10607.
95. Mishra, S., Grewal, J., Wal, P., Bhivshet, G. U., Tripathi, A. K., & Walia, V. (2024). Therapeutic potential of vasopressin in the treatment of neurological disorders. *Peptides*, *174*, 171166.
96. Koliqi, R., Fathima, A., Tripathi, A. K., Sohi, N., Jesudasan, R. E., & Mahapatra, C. (2023). Innovative and Effective Machine Learning-Based Method to Analyze Alcoholic Brain Activity with Nonlinear Dynamics and Electroencephalography Data. *SN Computer Science*, *5*(1), 113.
97. Tripathi, A. K., Diwedi, P., Kumar, N., Yadav, B. K., & Rathod, D. (2022). Trigonella Foenum Grecum L. Seed (Fenugreek) Pharmacological Effects on Cardiovascular and Stress Associated Disease. *NeuroQuantology*, *20*(8), 4599.
98. Sahu, P., Sharma, G., Verma, V. S., Mishra, A., Deshmukh, N., Pandey, A., ... & Chauhan, P. (2022). Statistical optimization of microwave assisted acrylamide grafting of Linum usitatissimum Gum. *NeuroQuantology*, *20*(11), 4008.
99. Biswas, D., Sharma, G., Pandey, A., Tripathi, A. K., Pandey, A., Sahu, P., ... & Chauhan, P. (2022). Magnetic Nanosphere: Promising approach to deliver the drug to the site of action. *NeuroQuantology*, *20*(11), 4038.
100. Ramya, S., Devi, R. S., Pandian, P. S., Suguna, G., Suganya, R., & Manimozhi, N. (2023). Analyzing Big Data challenges and security issues in data privacy. *International Research Journal of Modernization in Engineering Technology and Science*, *5*(2023), 421-428.
101. Pandian, P. S., & Srinivasan, S. (2016). A Unified Model for Preprocessing and Clustering Technique for Web Usage Mining. *Journal of Multiple-Valued Logic & Soft Computing*, *26*.
102. Muthukumar, K. K. M., & Pandian, S. Analyzing and Improving the Performance of Decision Database with Enhanced Momentous Data Types. *Asia Journal of Information Technology*, *16*(9), 699-705.
103. Pandian, P. S. (2023). RETRACTED: Adopting security checks in business transactions using formal-oriented analysis processes for entrepreneurial students. *International Journal of Electrical Engineering & Education*, *60*(1_suppl), 1357-1365.
104. Karthick, R., & Pragasam, J. (2019). D "Design of Low Power MPSoC Architecture using DR Method" Asian Journal of Applied Science and Technology (AJAST) Volume 3, Issue 2.
105. Karthick, R. (2018). Deep Learning For Age Group Classification System. *International Journal Of Advances In Signal And Image Sciences*, *4*(2), 16-22.
106. Karthick, R., Akram, M., & Selvaprasanth, P. (2020). A Geographical Review: Novel Coronavirus (COVID-19) Pandemic. *A Geographical Review: Novel Coronavirus (COVID-19) Pandemic (October 16, 2020). Asian Journal of Applied Science and Technology (AJAST)(Quarterly International Journal) Volume*, *4*, 44-50.
107. Karthick, R. (2018). Integrated System For Regional Navigator And Seasons Management. *Journal of Global Research in Computer Science*, *9*(4), 11-15.
108. Kavitha, N., Soundar, K. R., Karthick, R., & Kohila, J. (2024). Automatic video captioning using tree hierarchical deep convolutional neural network and ASRNN-bi-directional LSTM. *Computing*, *106*(11), 3691-3709.
109. Selvan, M. A. (2023). INDUSTRY-SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM.
110. Selvan, M. Arul. "PHISHING CONTENT CLASSIFICATION USING DYNAMIC WEIGHTING AND GENETIC RANKING OPTIMIZATION ALGORITHM." (2024).
111. Selvan, M. Arul. "Innovative Approaches in Cardiovascular Disease Prediction Through Machine Learning Optimization." (2024).

112. Kumar, T. V. (2024). A Comparison of SQL and NO-SQL Database Management Systems for Unstructured Data.
113. Kumar, T. V. (2024). A Comprehensive Empirical Study Determining Practitioners' Views on Docker Development Difficulties: Stack Overflow Analysis.
114. 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.
115. 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.
116. Sharma, S., & Dutta, N. (2024). Examining ChatGPT's and Other Models' Potential to Improve the Security Environment using Generative AI for Cybersecurity.
117. Sharma, S., & Dutta, N. (2016). Analysing Anomaly Process Detection using Classification Methods and Negative Selection Algorithms.
118. Sakshi, S. (2023). Development of a Project Risk Management System based on Industry 4.0 Technology and its Practical Implications.
119. Arora, P., & Bhardwaj, S. (2021). Methods for Threat and Risk Assessment and Mitigation to Improve Security in the Automotive Sector. *Methods*, *8*(2).
120. Arora, P., & Bhardwaj, S. (2020). Research on Cybersecurity Issues and Solutions for Intelligent Transportation Systems.
121. Arora, P., & Bhardwaj, S. (2019). The Suitability of Different Cybersecurity Services to Stop Smart Home Attacks.
122. Arora, P., & Bhardwaj, S. (2017). A Very Safe and Effective Way to Protect Privacy in Cloud Data Storage Configurations.
123. Arora, P., & Bhardwaj, S. (2017). Investigation and Evaluation of Strategic Approaches Critically before Approving Cloud Computing Service Frameworks.
124. Arora, P., & Bhardwaj, S. (2017). Enhancing Security using Knowledge Discovery and Data Mining Methods in Cloud Computing.
125. Arora, P., & Bhardwaj, S. (2019). Safe and Dependable Intrusion Detection Method Designs Created with Artificial Intelligence Techniques. *machine learning*, *8*(7).
126. Sharma, S., & Dutta, N. (2024). Examining ChatGPT's and Other Models' Potential to Improve the Security Environment using Generative AI for Cybersecurity.
127. Sakshi, S. (2023). Development of a Project Risk Management System based on Industry 4.0 Technology and its Practical Implications.
128. Sharma, S., & Dutta, N. (2018). Development of New Smart City Applications using Blockchain Technology and Cybersecurity Utilisation. *Development*, *7*(11).
129. Sharma, S., & Dutta, N. (2017). Classification and Feature Extraction in Artificial Intelligence-based Threat Detection using Analysing Methods.
130. Sharma, S., & Dutta, N. (2017). Development of Attractive Protection through Cyberattack Moderation and Traffic Impact Analysis for Connected Automated Vehicles. *Development*, *4*(2).
131. Sharma, S., & Dutta, N. (2016). Analysing Anomaly Process Detection using Classification Methods and Negative Selection Algorithms.
132. Sharma, S., & Dutta, N. (2015). Evaluation of REST Web Service Descriptions for Graph-based Service Discovery with a Hypermedia Focus. *Evaluation*, *2*(5).
133. Sharma, S., & Dutta, N. (2015). Cybersecurity Vulnerability Management using Novel Artificial Intelligence and Machine Learning Techniques.
134. Sharma, S., & Dutta, N. (2015). Distributed DNN-based Middleware for Cyberattack Detection in the Smart IOT Ecosystem: A Novel Framework and Performance Evaluation Technique.
135. Sakshi, S. (2024). A Large-Scale Empirical Study Identifying Practitioners' Perspectives on Challenges in Docker Development: Analysis using Stack Overflow.
136. Sakshi, S. (2023). Advancements and Applications of Generative Artificial Intelligence and show the Experimental Evidence on the Productivity Effects using Generative Artificial Intelligence.
137. Bhat, S. (2024). Building Thermal Comforts with Various HVAC Systems and Optimum Conditions.
138. Bhat, S. (2020). Enhancing Data Centre Energy Efficiency with Modelling and Optimisation of End-To-End Cooling.
139. Bhat, S. (2016). Improving Data Centre Energy Efficiency with End-To-End Cooling Modelling and Optimisation.
140. Bhat, S. (2015). Deep Reinforcement Learning for Energy-Saving Thermal Comfort Management in Intelligent Structures.
141. Bhat, S. (2015). Design and Function of a Gas Turbine Range Extender for Hybrid Vehicles.
142. Bhat, S. (2023). Discovering the Attractiveness of Hydrogen-Fuelled Gas Turbines in Future Energy Systems.

143. Bhat, S. (2019). Data Centre Cooling Technology's Effect on Turbo-Mode Efficiency.
144. Bhat, S. (2018). The Impact of Data Centre Cooling Technology on Turbo-Mode Efficiency.
145. Bhat, S. (2015). Technology for Chemical Industry Mixing and Processing. *Technology*, *2*(2).
146. Bauri, K. P., & Sarkar, A. (2016). Flow and scour around vertical submerged structures. *Sādhanā*, *41*, 1039-1053.
147. Bauri, K. P., & Sarkar, A. (2020). Turbulent bursting events within equilibrium scour holes around aligned submerged cylinder. *Journal of Turbulence*, *21*(2), 53-83.
148. Bauri, K. P., & Sarkar, A. (2019). Turbulent burst-sweep events around fully submerged vertical square cylinder over plane bed. *Environmental Fluid Mechanics*, *19*, 645-666.
149. Bauri, K. P. (2022). Coherent structures around submerged circular and square cylinders due to change of orientation angle in steady current over plane bed. *Acta Geophysica*, *70*(5), 2223-2250.
150. Polamarasetti, A. (2024, November). Research developments, trends and challenges on the rise of machine learning for detection and classification of malware. In *2024 International Conference on Intelligent Computing and Emerging Communication Technologies (ICEC)* (pp. 1-5). IEEE.
151. Polamarasetti, A. (2024, November). Machine learning techniques analysis to Efficient resource provisioning for elastic cloud services. In *2024 International Conference on Intelligent Computing and Emerging Communication Technologies (ICEC)* (pp. 1-6). IEEE.
152. Polamarasetti, A. (2024, November). Role of Artificial Intelligence and Machine Learning to Enhancing Cloud Security. In *2024 International Conference on Intelligent Computing and Emerging Communication Technologies (ICEC)* (pp. 1-6). IEEE.
153. Gollangi, H. K., Bauskar, S. R., Madhavaram, C. R., Galla, E. P., Sunkara, J. R., & Reddy, M. S. (2020). Echoes in Pixels: The intersection of Image Processing and Sound detection through the lens of AI and Ml. *International Journal of Development Research*, *10*(08), 39735-39743.
154. Reddy, M. S., Sarisa, M., Konkimalla, S., Bauskar, S. R., Gollangi, H. K., Galla, E. P., & Rajaram, S. K. (2021). Predicting tomorrow's Ailments: How AI/ML Is Transforming Disease Forecasting. *ESP Journal of Engineering & Technology Advancements*, *1*(2), 188-200.
155. Boddapati, V. N., Sarisa, M., Reddy, M. S., Sunkara, J. R., Rajaram, S. K., Bauskar, S. R., & Polimetla, K. (2022). Data migration in the cloud database: A review of vendor solutions and challenges. *Available at SSRN 4977121*.
156. Boddapati, V. N., Sarisa, M., Reddy, M. S., Sunkara, J. R., Rajaram, S. K., Bauskar, S. R., & Polimetla, K. (2022). Data migration in the cloud database: A review of vendor solutions and challenges. *Available at SSRN 4977121*.
157. Patra, G. K., Rajaram, S. K., Boddapati, V. N., Kuraku, C., & Gollangi, H. K. (2022). Advancing Digital Payment Systems: Combining AI, Big Data, and Biometric Authentication for Enhanced Security. *International Journal of Engineering and Computer Science*, *11*(08), 10-18535.
158. Patra, G. K., Rajaram, S. K., & Boddapati, V. N. (2019). Ai And Big Data In Digital Payments: A Comprehensive Model For Secure Biometric Authentication. *Educational Administration: Theory and Practice*.
159. Boddapati, V. N., Galla, E. P., Sunkara, J. R., Bauskar, S., Patra, G. K., Kuraku, C., & Madhavaram, C. R. (2021). Harnessing the Power of Big Data: The Evolution of AI and Machine Learning in Modern Times. *ESP Journal of Engineering & Technology Advancements*, *1*(2), 134-146.
160. Singh, K., & Neeru, N. (2023). A COMPREHENSIVE STUDY OF THE IOT ATTACKS ON DIFFERENT LAYERS. *Journal Punjab Academy of Sciences*, *23*, 140-155.
161. Singh, K., & Neeru, N. (2023). A COMPREHENSIVE STUDY OF THE IOT ATTACKS ON DIFFERENT LAYERS. *Journal Punjab Academy of Sciences*, *23*, 140-155.
162. Ravi, P., Haritha, D., & Obulesh, A. (2022). Average Iceberg Queries Computation Using Bitmap Indexes On Health Care Data. *Journal of Pharmaceutical Negative Results*, 3724-3731.