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SPECTRUM

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61	189	48	6
PAPERS	AUTHORS	INSTITUTIONS	COUNTRIES

INSIDE THIS ISSUE

Using Tessellation Art to Understand the Properties of Quadrilateral Theorems in... p. 1

Comparative Compressive Strength of Concrete Masonry Blocks with Partial Replacement of... p. 12

Flexible Concrete Blankets for Slope Stabilization and Erosion Control p. 16

IJARIIT SPECTRUM

Spectrum is an e-magazine with the comprehensive collection of all the papers that have been published in our journal over the last two months — Volume 12, Issue 2 (March-April, 2026). This edition brings together 61 papers by 189 authors from 48 institutions. Each entry links to the abstract and the full paper.

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THIS EDITION AT A GLANCE

Research areas	
Civil Engineering	12
Psychology	3
Mechanical Engineering	3
Economics	2
Arts	2
Economics & Finance	2

Authors by country	
India	56
Pin -761103	1
Albania	1
United States	1
Sri Lanka	1
Nigeria	1

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Indexing of Volume 12 – Issue 2

S. No	Title	Page Number	Links
1.	**Using Tessellation Art to Understand the Properties of Quadrilateral Theorems in Class 9** *Dipika Thakur, Shahina Shaikh* **Adani Vidya Mandir, Ahmedabad**	1-11	View Abstract Download PDF
2.	**Comparative Compressive Strength of Concrete Masonry Blocks with Partial Replacement of Cement by Fly Ash and GGBS** *Harsh Rahate, Kajal Sangle, Pritee Gite, Madhul Jagtap, Sanskruti Dharmale* **Vivekanand Education Society's Polytechnic, Sindhi Society, Chembur, Mumbai, Maharashtra**	12-15	View Abstract Download PDF
3.	**Flexible Concrete Blankets for Slope Stabilization and Erosion Control** *Krishna Yadav, Sunny Gupta, Vinit Waghmare, Niraj Patil, Sagar Mungase* **Vivekanand Education Society's Polytechnic, Sindhi Society, Chembur, Mumbai, Maharashtra**	16-18	View Abstract Download PDF
4.	**Ferrocement Detachable Toilet Unit** *Hriday S. Sawant, Rugved M. Purkar, Vedant J. Vishe, Piyush M. Shinde, Sagar Mungase* **VES Polytechnic, Mumbai, Maharashtra**	19-21	View Abstract Download PDF
5.	**Use of Bamboo as Reinforcement Material** *Yogesh Balasaheb Kamble, Prathamesh Kamble, Gaurav Ahire, Bhushan Ghodeswar, Suraj Surve* **Vivekanand Education Society Polytechnic, Mumbai, Maharashtra**	22-25	View Abstract Download PDF
6.	**Groundwater Recharge through Permeable Pavement** *Karan R Varadkar, Mayuresh Sawant, Advait Naik, Saksham Patil, Sagar Mungase* **V.E.S. Polytechnic, Mumbai, Maharashtra**	26-28	View Abstract Download PDF
7.	**Factors Influencing Depression in Teenagers** *Monisha Dangeti* **Amity Global School, Noida**	29-32	View Abstract Download PDF
8.	**Integrating Artificial Intelligence in Modern Businesses** *Ayushh Rao* **Pathways World School, Gurgaon**	33-37	View Abstract Download PDF
9.	**Financial Literacy of Rural Women in India** *Saachi Kanekar* **Reliance Foundation School, Maharashtra**	38-41	View Abstract Download PDF

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S.No	Title	Page Number	Links
10.	**The correlation between salary and the performance of the NBA players** *Jayesh Sharma* **St Xavier's High School, Haryana**	42-46	View Abstract Download PDF
11.	**SentinelStore: A Zero-Knowledge, Fault-Tolerant Decentralized Storage Architecture Utilizing Shamir's Secret Sharing and Kademlia DHT** *Saketh Narkidimilli, Prudhvi Saranya Tatini, Sathvika Kollepara, Sandeep Peruri, Murala Sasidhar, Subhas Chette, Kiranmai Merum* **Sri Vasavi Engineering College, Andhra Pradesh**	47-51	View Abstract Download PDF
12.	**Performance and Musical System in Prahllad Nataka Tradition** *Dr. Ajit Kumar Muni* **Aska Science College, Odisha**	52-56	View Abstract Download PDF
13.	**A Comprehensive Survey on Automated Concept Extraction and Prerequisite Dependency Detection in Educational Texts** *Aditi Patil, Riya Hankare, Shreya Araganji, Nidhi Chaudhari, Siddharth K. Gaikwad* **COEP Technological University, Maharashtra**	57-62	View Abstract Download PDF
14.	**Oily Wastewater Treatment using Adsorption Method** *Khushi Ghadigaonkar, Karuna Gaikwad, Ranjana Waghmare, Jay Pujari, Sanskruti Dharmale* **Vivekanand Education Society's Polytechnic College, Maharashtra**	63-65	View Abstract Download PDF
15.	**Triple Deck Express Way** *Darshan Badar, Deepak Salve, Jaysen Sahu, Omkar Mural, Suraj surve* **Vivekanand Education Society's Polytechnic College, Maharashtra**	66-67	View Abstract Download PDF
16.	**Strategies to Increase the Adoption of Fintech among Retail Consumers Globally** *Vihaan Pandey* **The Shri Ram School Aravali, Haryana**	68-70	View Abstract Download PDF
17.	**Tradition and Transformation: Contemporary Challenges of Prahllad Nataka** *Dr. Ajit Kumar Muni* **Aska Science College, Odisha**	71-74	View Abstract Download PDF
18.	**Effect of Silica Fume and Fly Ash on Strength Development of High Strength Concrete** *Priya Jha, Tarun Kumar Rajak, Alok Kumar Jain* **Shri Shankaracharya Institute of Professional Management and Technology, Chhattisgarh**	75-82	View Abstract Download PDF

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S.No	Title	Page Number	Links
19.	**Global Cryptocurrency Regulation: A Comparative Analysis using India as a Benchmark** *Arav Sahni* **Heritage Xperiential Learning School, Haryana**	83-89	View Abstract Download PDF
20.	**Evolution and Emerging Trends in Programming Languages: A Survey** *Bojken Shehu* **Polytechnic University of Tirana, Albania**	90-93	View Abstract Download PDF
21.	**Evolution of Artificial Organs** *Meher Gupta* **Step by Step School, Noida, Uttar Pradesh**	94-98	View Abstract Download PDF
22.	**The Science behind Prosthetics and Advancements in the Field** *Nyra Jain* **Tridha, Maharashtra**	99-102	View Abstract Download PDF
23.	**A Comparative Study of Decentralized Storage Systems: IPFS vs Traditional Cloud Storage** *Kyrylo Sotnykov* **Independent Researcher**	103-107	View Abstract Download PDF
24.	**Are Entrepreneurship Subsidies Effective in Reducing Urban Youth Unemployment?** *Aarohi Banerjie* **O.P. Jindal Global University, Haryana**	108-112	View Abstract Download PDF
25.	**Engineering Analysis and Restoration of Go-kart** *Niel Omkar Deshpande, Umar Aslam Aga, Ryan Robert Dolare, Rakshit Ramesh Lagad* **Bharati Vidyapeeth's Jawaharlal Nehru Institute of Technology, Maharashtra**	113-118	View Abstract Download PDF
26.	**Improvement Stability of Black Cotton Soil by using Marble Dust and Burnt Brick Powder** *Awaiz Masjid Shaikh, Afeef Ismail Kazi, Ritash Kalyani Harkude, Hrishikesh Sandeep Kamble, Sanskruti Dharmale* **Vivekanand Education Society's Polytechnic College, Maharashtra**	119-121	View Abstract Download PDF
27.	**Improving the Availability and Functional Status of Medical Equipment through a Clinical Audit Cycle: A Quality Improvement Study at Base Hospital Akkaraipattu, Sri Lanka** *Dr. AB. Mashooth* **Ministry of Health, Sri Lanka**	122-126	View Abstract Download PDF

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S.No	Title	Page Number	Links
28.	**What are the Implications of Using Deep Brain Stimulation to Treat and Improve Symptoms of Depression?** *Krisha Dhawal Maniyar* **GEMS Wellington International School, United Arab Emirates**	127-132	View Abstract Download PDF
29.	**JobPilot: AI-Powered Autonomous Job Application Agent** *Oduri Srinivas, Rapaka Divya, Tamma Srivalli, Kengam Sai Madhava Kumar, Vamsetti Reshma, Narina Manoj Naidu, Loshma Gunisetti* **Sri Vasavi Engineering College, Andhra Pradesh**	133-137	View Abstract Download PDF
30.	**Thermocol (EPS) Insulated Concrete Forms** *Kunal Suradkar, Manish Chaudhary, Yogesh shinde, Sagar mungase* **Vivekanand Education Society's Polytechnic College, Maharashtra**	138-139	View Abstract Download PDF
31.	**Analysis of Deburring and Edge Finishing** *Sakshi Sanjay Kunjir, Neha Rajendra Nagtilak, Harshwardhan Avinash Yadav, Aryan Abhijit Kadam, Niel Deshpande* **Bharati Vidyapeeth's Jawaharlal Nehru Institute of Technology, Maharashtra**	140-144	View Abstract Download PDF
32.	**Bamboo as A Sustainable Material** *Satyajeet Nayak, Abu Huraira, Nikhil Gaikwad, Divyansh Mahulkar, Anushri Isal* **Vivekanand Education Society's Polytechnic College, Maharashtra**	145-147	View Abstract Download PDF
33.	**Colour as Visual Language: A Study of Cinematic Colour Theory and Audience Perception** *Pragati* **GD Goenka Signature School, Gurgaon, Haryana**	148-154	View Abstract Download PDF
34.	**Social Media Addiction and Its Impact on Teenage Mental Health** *Mannat Bansal* **K.R. Mangalam World School, Haryana**	155-158	View Abstract Download PDF
35.	**A Comparative Study of Steer-by-Wire and Conventional Steering Systems in Autonomous Vehicles** *Ishaan Singh* **Heritage International Xperiential School, Haryana**	159-165	View Abstract Download PDF
36.	**Developing Eco-friendly Concrete Using Plastic and E-Waste Aggregate** *Soham Gharwadhave, Ravi Gupta, Southabh Jana, Hrutik Mahapatra, Suraj Santosh Surve* **Vivekanand Education Society's Polytechnic College, Maharashtra**	166-168	View Abstract Download PDF

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S.No	Title	Page Number	Links
37.	**GSM Based Elderly Health Monitoring System** *Aji Preethika, C.Parameshwari, K. Ramya, R. Vigneshwaran* **SRG Engineering College, Tamil Nadu**	169-175	View Abstract Download PDF
38.	**Psychological Interventions for Children Having Dyscalculia and Dysgraphia** *Raghvi Khatri* **Amity University, Uttar Pradesh**	176-182	View Abstract Download PDF
39.	**How are AI Advancements Supporting People with Learning Disabilities to Achieve their Maximum Potential?** *Yashi Upadhyay* **Mount Olympus School, Haryana**	183-187	View Abstract Download PDF
40.	**The Theory and Practice behind Workplace Behaviour** *Yashasvi Agrawal* **Sancta Maria International School, Haryana**	188-193	View Abstract Download PDF
41.	**Tracking System for E-commerce Product** *Roopam Kashte, Rubana Khan, Anis Ansari, Shivam Uttarwar, Piyush Kalbande, Harshal Thakur* **Priyadarshini College of Engineering, Maharashtra**	194-199	View Abstract Download PDF
42.	**Effects of Minefields on Livelihood Access of Resettled Internally Displaced Persons IDPs in Borno State, Nigeria** *Babagana Zannah Audu, Mohammed Kaka Shettima* **Umar Ibn Ibrahim El-Kaneni College of Education, Science and Technology, Bama, Borno State, University of Maiduguri, Nigeria**	200-203	View Abstract Download PDF
43.	**Design and Development of a Portable Generator Using Scrap Materials** *Gayatri Madhu Varpe, Sachin Madan Rathod, Santosh Sitaram Devkar, Prathamesh Balaji Bedjawalge* **Bharati Vidyapeeth's Jawaharlal Nehru Institute of Technology, Maharashtra**	204-207	View Abstract Download PDF
44.	**How Effective is Origami as a Pedagogical Tool for Teaching Geometric Concepts Compared to Traditional Methods** *Sachit Venkatesh* **Shiv Nadar School, Haryana**	208-210	View Abstract Download PDF
45.	**Development of Green Concrete using Agricultural Waste Ashes (Rice Husk Ash and Sugarcane Bagasse Ash) as Partial Cement Replacement** *Rakulram S, Santhoshkumar K, Sethupathi N L, Raghulram V, Karthikeyan G* **Kumaraguru College of Technology, Tamil Nadu**	211-219	View Abstract Download PDF

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S.No	Title	Page Number	Links
46.	**Hack Hub** *Singh Himanshu Arvind, Shraddha Jaysing Taware, Afifa Chaudhary, Samruddhi Mahesh Surve, Pratiksha Deshmukh* **Bharat College of Engineering, Maharashtra**	220-225	View Abstract Download PDF
47.	**Smart IoT Based Battery Management System for EV Battery** *Naveen Kumar Vadduri, Sekhar Bodaballa, Ajay Kumar Babu Penigandla, Sunil Kumar Varagani, Rakesh Mudadla* **Vasireddy Venkatadri Institute of Technology, Andhra Pradesh**	226-228	View Abstract Download PDF
48.	**Design and Development of a Smart Drug Delivery System Using IoT** *V. Saranya V, S. Rajasri, M.S Gayathri, M. Sanjay, M. Jayanthi* **SRG Engineering College, Tamil Nadu**	229-229	View Abstract Download PDF
49.	**FinTrack – A Finance Tracker** *Sahil C. Madankar, Sankalp S. Pawar, Tanushree S. Patle, Vidhi P. Harode, Shivang R. Nagpure, Sakshi S. Zade, Shrawani H. Bijwar, Prof. P. A. Kuchewar, Prof. M. R. Balbudhe* **Karmaveer Dadasaheb Kannamwar Engineering College, Maharashtra**	230-233	View Abstract Download PDF
50.	**Understanding Popular Music: What Makes it Catchy?** *Anya Dayal* **The Shri Ram School, Haryana**	234-237	View Abstract Download PDF
51.	**Wearable IoT-Based Real-Time Arrhythmia Detection and Cardiac Risk Prediction System Using Machine Learning** *Shanmugapriya. R, Thavaselvi. D, Thiripurasundari. M, kalaivanan. M, Vigneshwaran. R* **SRG Engineering College, Tamil Nadu**	238-239	View Abstract Download PDF
52.	**The Promise of Xenotransplantation** *Sneha Rajasekar* **Bethany High School, Karnataka**	240-245	View Abstract Download PDF
53.	**Narcissistic Personality Disorder: An Overview** *Aryan Batra* **Suncity School, Haryana**	246-252	View Abstract Download PDF
54.	**FindMyStuff – An Automated Lost and Found Management System** *Vaishnavi Duratkar, Snehal Ninawe, Twinkal Sapate, Sharwari Mohadikar, Ashwary Dhakate, Sanket Barapatre* **Karmaveer Dadasaheb Kannamwar Engineering College, Maharashtra**	253-258	View Abstract Download PDF

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S.No	Title	Page Number	Links
55.	**Detecting Misinformation in News Using BERT and Natural Language Processing** *Ankannagari Harshith Reddy, Tabitha Indupalli, Dinesh Ragipani, T.Dheeraj, Ch.Bhanu uday* **Gokaraju Rangaraju Institute of Engineering and Technology, Telangana**	259-265	View Abstract Download PDF
56.	**News-Aware Stock Market Movement Prediction for India Retail Traders** *Arun Kumar K, Shan Shad M, Gokul Karthik G M, Anitha P* **Kumaraguru College of Technology, Tamil Nadu**	266-271	View Abstract Download PDF
57.	**Feminova – New Era of Women's Health** *Meghna Pawar, Shravani Patil, Saloni Sawant, Arundhati Niwatkar, Rachana Dhanawat* **Usha Mittal Institute of Technology, Maharashtra**	272-278	View Abstract Download PDF
58.	**A Proof-Carrying Medical Legal Right Advisor where Natural Language Generation is Intentionally Non-Intelligent** *Nambarm Athoiba Khuman, Naman Kumar Sharma, Soshya Joshi* **SRM Institute of Science and Technology, Tamil Nadu**	279-284	View Abstract Download PDF
59.	**CAMPULSE – A Platform Connecting Students, Events & Achievements** *Om D. Ninawe, Maithili S. Dhage, Nihal J. Bawankule, Vedant H. Borkute, Ashwini S. Galhat, Vipul V. Tayde, Chaitanya A.Betwar, Dr. A. A. Jaiswal, Prof. S. B. Verma* **Karmaveer Dadasaheb Kannamwar College of Engineering, Maharashtra**	285-290	View Abstract Download PDF
60.	**The Impact of Corporate Social Responsibility Initiatives on Employees' Rights** *Satya Rishishwar* **University of Mumbai, Maharashtra**	291-294	View Abstract Download PDF
61.	**End to End Retail Demand Forecasting for Inventory Optimization using Machine Learning and MLOps** *Pratibha Kambi* **University of San Diego, California**	295-308	View Abstract Download PDF

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ABSTRACTS

1 Using Tessellation Art to Understand the Properties of Quadrilateral Theorems in Class 9

Paper ID V12I2-1138 · Pages 1-11 · Mathematics Education (art-integrated

Dipika Thakur, Lecturer, Adani Vidya Mandir, Ahmedabad
Shahina Shaikh, Lecturer, Adani Vidya Mandir, Ahmedabad

This study, conducted by Ms. Dipika Thakur and Ms. Shahina Shaikh at Adani Vidya Mandir Ahmedabad, integrates tessellation art into Class 9 quadrilateral theorem teaching to enhance conceptual understanding beyond rote-learning limitations. Employing a five-phase design—traditional teaching, pre-assessment, art-integrated teaching (tessellation art and load-bearing paper folding), post-assessment, and comparative analysis—the research evaluates art-based methods' impact on engagement and comprehension. Pre-tests revealed significant gaps in students' grasp of quadrilateral properties. The art-integrated phase used hands-on tessellation activities to visualise abstract concepts tangibly, boosting participation and enthusiasm. Post-tests, mirroring pre-test formats, showed marked improvements—e.g., students scoring 0.5-1 initially reached 9.5-10. Graphical comparisons and qualitative feedback from teachers/students highlighted trends in better understanding, accessibility, and enjoyment. In conclusion, tessellation art fosters deeper engagement and conceptual mastery, offering a transformative alternative to traditional geometry instruction with broader STEM education implications.

Keywords: Tessellation Art, Quadrilaterals, Parallelogram Properties, Art-Integrated Learning, Conceptual Understanding

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2 Comparative Compressive Strength of Concrete Masonry Blocks with Partial Replacement of Cement by Fly Ash and GGBS

Paper ID V12I2-1147 · Pages 12-15 · Civil Engineering

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The present study investigates the compressive strength performance of concrete masonry blocks produced with partial replacement of cement using fly ash and ground granulated blast furnace slag (GGBS). The motivation behind the research is twofold: the need to reduce cement consumption in construction and the necessity of utilizing industrial by-products in a sustainable manner. The work examines four replacement levels, namely 0%, 10%, 20%, and 30%, of cement by fly ash and GGBS. Concrete blocks were cast under controlled laboratory conditions, cured for 7, 14, and 28 days, and subjected to compressive strength testing.

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The experimental results demonstrated that replacement levels up to 20% generally maintain compressive strength comparable to conventional concrete blocks, while 30% replacement leads to a slight reduction in strength but improves long-term durability and environmental benefits. The study concludes that partial replacement of cement with fly ash and GGBS is a feasible strategy for sustainable block manufacturing without compromising essential strength requirements.

Keywords: Concrete Blocks, Fly Ash, GGBS, Compressive Strength, Sustainable Masonry, Partial Replacement.

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3 Flexible Concrete Blankets for Slope Stabilization and Erosion Control

Paper ID V12I2-1159 · Pages 16-18 · Civil Engineering

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Concrete blankets, also referred to as Geosynthetic Cementitious Composite Mats (GCCMs), are an innovative class of construction materials used for rapid slope protection, erosion control, and infrastructure lining. They consist of a dry concrete mix encapsulated between layers of geotextiles and fiber meshes that harden upon hydration. Unlike conventional rigid concrete systems, concrete blankets are flexible before setting and conform easily to irregular surfaces. This paper presents a comprehensive technical review of concrete blankets with emphasis on their composition, manufacturing concept, mechanical properties, durability, and field applications. It also discusses installation methodology, testing procedures, and performance evaluation based on experimental and field studies. Results reported in literature indicate compressive strengths of 30–45 MPa, high erosion resistance, and long-term durability under harsh environmental conditions. The study concludes that concrete blankets provide a sustainable, efficient, and cost-effective alternative for slope stabilization, especially in remote and difficult terrains.

Keywords: Concrete Blanket, GCCM, Slope Stabilization, Erosion Control, Geosynthetics, Sustainable Construction.

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4 Ferrocement Detachable Toilet Unit

Paper ID V12I2-1157 · Pages 19-21 · Civil Engineering

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The lack of hygienic sanitation facilities remains a major concern in rural, urban slum, and temporary settlement areas. Conventional toilet structures constructed using brick masonry or reinforced cement concrete

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are expensive, time- consuming, and not suitable for relocation. This paper presents the design and development of a ferrocement detachable toilet unit as a low-cost, durable, and portable sanitation solution. Ferrocement panels reinforced with wire mesh are used to achieve high strength with reduced thickness and weight. The detachable design allows easy transportation, assembly, dismantling, and reuse of the unit. The paper discusses materials used, construction methodology, advantages, limitations, cost estimation, and potential applications. The proposed system supports sustainable sanitation practices and is suitable for rural development and emergency applications.

Keywords: Ferrocement, Sanitation, Portable Toilets, Detachable Units, Sustainable Sanitation, Prefabrication.

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5 Use of Bamboo as Reinforcement Material

Paper ID V12I2-1155 · Pages 22-25 · Civil Engineering

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Access to hygienic sanitation facilities remains a major challenge in developing nations, particularly in rural areas, slums, and temporary settlements. Conventional toilets require permanent construction, high costs, and long installation time, making them unsuitable for rapid deployment. This paper presents the design and development of a ferrocement detachable toilet unit as a cost-effective, durable, and portable sanitation solution. The unit is fabricated using thin ferrocement panels reinforced with wire mesh, which are lightweight yet strong. The system is designed for easy assembly, disassembly, and relocation, making it highly suitable for construction sites, disaster relief camps, and rural sanitation programs. The study highlights the design methodology, material selection, structural performance, cost-effectiveness, and future applications of this innovation.

Keywords: Ferrocement, Sanitation, Portable Toilets, Detachable Units

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6 Groundwater Recharge through Permeable Pavement

Paper ID V12I2-1153 · Pages 26-28 · Civil Engineering

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Rapid urbanization has led to increased impervious surfaces such as conventional concrete and asphalt pavements, which prevent natural infiltration of rainwater into the ground. This results in groundwater depletion, surface runoff, and urban flooding. Permeable pavement is an innovative and sustainable solution

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that allows rainwater to pass through its surface and infiltrate into the underlying soil layers, thereby recharging groundwater. This paper studies the concept, working mechanism, components, and benefits of groundwater recharge through permeable pavements. The study highlights how permeable pavements can reduce runoff, improve water quality, and support sustainable urban water management. A simple model is also proposed to demonstrate the working of permeable pavement systems. This paper presents a detailed study on the concept, components, and working mechanism of groundwater recharge through permeable pavements. The benefits of this system, including runoff reduction, water quality improvement, and sustainable urban water management, are discussed. Additionally, a simple physical model is proposed to demonstrate the functioning of permeable pavement systems for educational and practical understanding.

Keywords: Permeable Pavement, Groundwater Recharge, Infiltration, Stormwater Management, Sustainable Infrastructure

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7 Factors Influencing Depression in Teenagers

Paper ID V12I2-1146 · Pages 29-32 · Psychology

Monisha Dangeti, Student, Amity Global School, Noida

This research paper explores depression among high school students and its impact on their mental well-being and academic experiences. It examines how adolescent depression is influenced by multiple interconnected factors, including family environment, school pressure, peer relationships, psychological characteristics, biological vulnerability, and cultural and societal influences. The paper highlights the importance of understanding depression within school settings and emphasizes the need for supportive environments, early awareness, and combined efforts from schools, families, and communities to promote adolescent mental health.

Keywords: Family Environment, Peer Relationships, Societal Influences, Adolescent Mental Health, Early Awareness.

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8 Integrating Artificial Intelligence in Modern Businesses

Paper ID V12I2-1145 · Pages 33-37 · Artificial Intelligence

Ayushh Rao, Student, Pathways World School, Gurgaon

Artificial intelligence is rapidly growing across the world and becoming an irreplaceable asset to modern businesses and decision-making processes. This research paper examines and showcases the role of AI adoption in business. It shows how AI can help businesses grow by improving customer personalization, decision-making accuracy, efficiency, and analysis of large amounts of data. The paper delves into how artificial intelligence plays a crucial role in shaping the future of businesses by providing better ideas and innovation, while also looking at the privacy and ethical concerns and challenges faced in AI integration in businesses.

Keywords: AI Adoption in Business, Artificial Intelligence, Decision Making, Personalization, Privacy Concerns, Challenges

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9 Financial Literacy of Rural Women in India

Paper ID V12I2-1140 · Pages 38-41 · Economics

Saachi Kanekar, Student, Reliance Foundation School, Maharashtra

Financial literacy is a key aspect in the life of an individual. Today both men and women work at an equal level, but women in the rural areas of India are not given a lot of freedom in this field. For women in India, financial literacy is still falling behind. People tend to learn about financial management through experiences of their own and others. The role of females in every rural family should not be neglected. This paper studies the level of financial literacy across various rural districts in India, understanding the engagement of women in financial services, identifying the key challenges faced by them, and offering suggestions to improve the financial literacy of women and discussing policies introduced that help them.

Keywords: Financial Literacy, Financial Inclusion, Women's Financial Empowerment, Economic Independence, Government Policies.

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10 The correlation between salary and the performance of the NBA players

Paper ID V12I2-1139 · Pages 42-46 · Labour Economics

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The salary of an NBA athlete depends on many factors like their performance, etc. And on the basis of that they are offered a contract. In this research paper I have examined all these factors, and on the basis of that I have created a calculator that predicts the salary of an NBA athlete when their performance data is entered. Next in the paper I have discussed what is the superstar effect and how it affects the salary of the players. I have also compared the statistics of different players to show how they contribute to their team on court.

Keywords: National Basketball Association, Superstar Effect, Win Shares, Player Efficiency Rating, Effective Field Goals

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11 SentinelStore: A Zero-Knowledge, Fault-Tolerant Decentralized Storage Architecture Utilizing Shamir’s Secret Sharing and Kademlia DHT

Paper ID V12I2-1166 · Pages 47-51 · Cybersecurity

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As the digital ecosystem becomes increasingly reliant on centralized cloud infrastructure, the vulnerabilities associated with single points of failure, data sovereignty, and privacy intrusion have become critical bottlenecks. This paper introduces SentinelStore, a novel decentralized storage protocol designed to shift the

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trust boundary entirely to the client edge. Unlike traditional distributed systems that rely on full-file replication, SentinelStore implements a Zero-Knowledge Architecture by performing all cryptographic operations—key generation, authenticated encryption, and Shamir's Secret Sharing (SSS)—directly within the user's browser. This ensures that the storage network remains mathematically oblivious to the data it holds. We propose a hybrid storage model that utilizes a Kademlia-based Distributed Hash Table (DHT) for resilient shard distribution and a metadata coordinator for access control, without compromising the zero-trust principle. Furthermore, we introduce an innovative Dynamic Re-sharding Orchestration mechanism, allowing administrators to mathematically alter the fault-tolerance parameters of stored data without decrypting it or requiring client intervention. Experimental results demonstrate that this architecture achieves information-theoretic security and high availability with significantly lower storage overhead compared to traditional replication strategies.

Keywords: Zero-Knowledge Architecture, Shamir's Secret Sharing (SSS), Kademlia Distributed Hash Table (DHT), Client-Side Cryptography, Dynamic Re-sharding, Data Sovereignty, Fault-Tolerant Distributed Systems.

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12 Performance and Musical System in Prahllad Nataka Tradition

Paper ID V12I2-1149 · Pages 52-56 · Arts

Dr. Ajit Kumar Muni, Research Scholar, Aska Science College, Odisha

Prahllad Nataka is a devotional musico-dramatic tradition of southern Odisha that integrates ritual invocation, narrative dramaturgy, classical music, and folk performance practices into a unified theatrical structure. This paper examines the performance grammar, character system, spatial organization, musical architecture, and aesthetic principles that define the form. Beginning with the ritual Mangalacharana/Nandigana and guided by the Sutradhara, the performance unfolds through a carefully structured dramatic progression centered on the conflict between Hiranyakashipu and Prahllad, culminating in the climactic manifestation of Narasimha. The study analyzes the interplay between major and minor characters, the incorporation of comic and didactic interludes, and the integration of tribal and folk performance elements within a predominantly rāga-based musical framework. The repertoire employs thirty-four rāgas and six tālas, reflecting a confluence of Carnatic and Hindustani classical traditions within a regional devotional theatre context. The spatial configuration—featuring a tiered wooden stage and symbolic pillar—reinforces the ritual symbolism central to the narrative. Costume and make-up practices exhibit strong affinities with South Indian classical theatre traditions such as Kathakali and Therukoothu, while maintaining localized Odishan elements. The sacred Narasimha mask functions simultaneously as theatrical property and ritual icon. Despite reductions in performance duration due to modern socio-cultural shifts, Prahllad Nataka continues to preserve its devotional intensity and aesthetic integrity, representing a living synthesis of classical dramaturgical principles and community-based ritual theatre.

Keywords: Musico-Dramatic Tradition, Narasimha Mask, Devotional Theatre Tradition, Nandigana, Mangalacharan, Sutradhara, Rasa

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13 A Comprehensive Survey on Automated Concept Extraction and Prerequisite Dependency Detection in Educational Texts

Paper ID V12I2-1151 · Pages 57-62 · Computer Engineering

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Automated extraction of concepts and detection of dependencies are important for analyzing educational texts and supporting applications like curriculum development, learning path suggestions, and intelligent tutoring systems. The aim of these tasks is to automatically extract key domain concepts from educational materials and find dependencies or prerequisites between them. Several approaches are put forward in recent studies, such as weakly supervised methods based on semantic embeddings and clustering, distant supervision techniques that make use of domain-specific glossaries, and supervised transformer-based models. Supervised models frequently exhibit high accuracy, but they rely significantly on large, manually labeled datasets. On the other hand, weakly and distantly supervised approaches drastically lower annotation costs, but they also face issues with seed quality, dictionary coverage, and cross-domain applicability. In order to guide future work in automated educational concept analysis, this study offers a thorough overview of current methods, frequently used datasets, assessment metrics, and recognized limits. It also addresses important issues and unresolved research gaps.

Keywords: Concept Extraction, Prerequisite Learning, Educational Data Mining, Knowledge Graphs, Natural Language Processing, Large Language Models.

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14 Oily Wastewater Treatment using Adsorption Method

Paper ID V12I2-1156 · Pages 63-65 · Civil Engineering

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The rapid growth of industrialization has led to the generation of large quantities of oily wastewater containing free oil, dispersed oil, emulsified oil, and dissolved hydrocarbons. Major sources include petroleum refineries, automobile service stations, metal finishing industries, and food processing units. If discharged without adequate treatment, oily wastewater causes severe environmental pollution by forming surface films on water bodies, reducing oxygen transfer, and adversely affecting aquatic ecosystems. Conventional treatment methods such as gravity separation, chemical coagulation, flotation, and membrane filtration often exhibit limitations including high capital and operating costs, excessive sludge generation, and reduced efficiency in treating stable oil–water emulsions. This project presents a comprehensive study on the adsorption method as an effective and sustainable approach for oily wastewater treatment. The performance of commonly used

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adsorbents, including activated carbon and low-cost bio-adsorbents such as rice husk ash and sawdust, is reviewed and analyzed. The influence of critical operating parameters such as pH, contact time, adsorbent dosage, temperature, and initial oil concentration on adsorption efficiency is discussed. Reported experimental investigations demonstrate that adsorption can achieve oil and grease removal efficiencies ranging from 85% to 95% under optimized conditions. The findings highlight that adsorption is a technically feasible, economical, and environmentally friendly tertiary treatment method, making it suitable for integration into industrial wastewater treatment systems.

Keywords: Oily Wastewater Treatment, Adsorption Process, Oil and Grease Removal, Activated Carbon, Bio-Adsorbents, Rice Husk Ash, Sawdust, Fixed-Bed Adsorption Column, Industrial Wastewater Treatment, and Environmental Pollution Control.

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15 Triple Deck Express Way

Paper ID V12I2-1171 · Pages 66-67 · Civil Engineering

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Triple-deck expressways are a modern transportation concept developed to manage heavy traffic congestion in highly populated urban areas where expanding roads horizontally is difficult. This system includes three vertically arranged levels of transport corridors within the same route. These levels may accommodate high-speed vehicle lanes, metro or railway lines, and local service roads. By utilising vertical space efficiently, triple-deck expressways increase road capacity, decrease travel time, and make better use of limited land. They are typically built using reinforced or prestressed concrete along with steel composite structures, supported by advanced foundation and seismic-resistant designs. Although the initial construction cost is high, such expressways provide a sustainable and long-term solution for improving urban transportation systems.

Keywords: Triple Deck Expressways, Urban Transportation, Vertical Road Infrastructure, Multi-Level Transportation System Infrastructure, Sustainable Transport, Land-Use Efficiency.

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16 Strategies to Increase the Adoption of Fintech among Retail Consumers Globally

Paper ID V12I2-1141 · Pages 68-70 · Economics

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This paper studies how the use of financial technology (fintech) can be increased among retail consumers across the world. It focuses on the role of financial literacy, differences in adoption between rural and urban areas, key reasons why people use fintech, and how these patterns vary across countries. Using survey data and global case studies, the paper finds that people with better financial and digital knowledge are more likely

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to use fintech services and continue using them over time. Financial literacy also helps build trust and confidence in digital financial products. The paper shows clear differences between rural and urban areas. Urban consumers adopt fintech faster due to better internet access, higher income levels, and greater exposure to digital services. In contrast, rural consumers often face challenges such as poor infrastructure, low digital skills, and a lack of trust. However, adoption in rural areas increases when fintech services are designed to meet local needs, such as using agent-based models, simple interfaces, and low-cost products. Global comparisons highlight that fintech adoption differs widely across countries depending on regulations, smartphone usage, and the strength of traditional banking systems. Based on these findings, the paper suggests strategies to increase adoption, including improving financial literacy, strengthening digital infrastructure, building consumer trust, and creating supportive regulations. Overall, the study provides practical recommendations for policymakers and fintech firms to promote wider and more inclusive use of fintech services.

Keywords: Fintech, Retail Consumers, Adoption, Digital Payments, UPI.

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17 Tradition and Transformation: Contemporary Challenges of Prahllad Nataka

Paper ID V12I2-1152 · Pages 71-74 · Arts

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Prahllad Nataka is a prominent devotional theatre tradition of southern Odisha, particularly concentrated in the undivided Ganjam district and adjoining regions of Andhra Pradesh. While its literary evolution reflects royal patronage and regional adaptation, the continuity and institutional consolidation of the form have been primarily sustained through the guru–shishya parampara (teacher–disciple tradition). This study examines how decentralized pedagogical networks of Gurus transformed Prahllad Nataka from a localized devotional performance into a structured regional theatre tradition. Drawing upon historical accounts, oral narratives, and field-based documentation of Guru lineages, the paper analyzes the processes of revival, reform, and standardization initiated during the early twentieth century. Particular attention is given to the role of reformers who systematized rāga–tāla patterns, regulated performance duration, refined costume codes, and preserved ritual discipline. The Guru in Prahllad Nataka functions not merely as an instructor but as director, composer, ritual custodian, and community leader, thereby embodying a multidimensional cultural authority. The study argues that the survival of Prahllad Nataka in the face of modernization, economic precarity, and institutional neglect is largely attributable to its embedded guru-centric transmission model. By foregrounding lineage as a living institution, the article highlights the significance of ritual pedagogy and community-based knowledge systems in sustaining traditional theatre forms in contemporary South Asia.

Keywords: Devotional Theatre Tradition, Guru–Shishya Parampara, Rga, Tala, Narasimha Mask, Court Centered Theatrical System.

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18 Effect of Silica Fume and Fly Ash on Strength Development of High Strength Concrete

Paper ID V12I2-1168 · Pages 75-82 · Civil Engineering

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High-strength concrete (HSC) is increasingly used in modern infrastructure due to its superior mechanical performance and durability. However, low water–binder ratios often reduce workability and affect durability. This study examines the influence of partial replacement of cement with silica fume and fly ash on the strength development and durability characteristics of high-strength concrete. M60 grade concrete was produced using Ordinary Portland Cement, with silica fume and fly ash added in equal proportions as supplementary cementitious materials. Cement replacement levels of 0%, 5%, 10%, 15%, and 20% were considered. Fresh concrete properties were evaluated using slump and compaction factor tests, while hardened concrete performance was assessed through compressive strength, flexural strength, split tensile strength, water absorption, sorptivity, and acid resistance tests. Results indicate that workability decreases with increasing replacement levels due to the high fineness of silica fume and fly ash. Mechanical strength properties improved significantly up to an optimum replacement level of 10%, beyond which strength reduced due to cement dilution. Durability tests showed a slight increase in water absorption and sorptivity at higher replacement levels, while acid resistance improved marginally at lower replacement levels. Overall, a combined replacement level of 10% silica fume and fly ash provides the best balance between strength enhancement and durability performance in high-strength concrete.

Keywords: Concrete, Silica Fume, Fly Ash, Strength, Mix Ratio, Fineness Modulus, Durability.

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19 Global Cryptocurrency Regulation: A Comparative Analysis using India as a Benchmark

Paper ID V12I2-1175 · Pages 83-89 · Economics & Finance

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The rapid expansion of the global cryptocurrency market has created deep inconsistencies in national regulatory responses of sovereign countries and has raised questions regarding policies, innovation, and state motives. This paper conducts a comparative analysis of global cryptocurrency regulation using India as a benchmark to explore how economies of the world create a balance between decentralization and regulation. Drawing from the economic contexts, regulatory frameworks, judicial interventions, and policies of nations across Asia, the Americas, Europe, Asia, the Middle East, and Oceania; the study inspects and identifies a variety of regulatory models, ranging from prohibitionist and control-centric regimes to liberal regimes that embrace innovation.

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Keywords: Global Cryptocurrency Regulation, Crypto-Assets Regulatory frameworks, International Crypto Policy, Comparative Cryptocurrency Regulation, Cryptocurrency Governance.

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20 Evolution and Emerging Trends in Programming Languages: A Survey

Paper ID V12I2-1179 · Pages 90-93 · Programming Languages

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Programming languages have experienced significant transformation since the inception of computing, continuously evolving to address the increasing complexity of software systems and the changing demands of modern technology. This paper presents a comprehensive survey of the evolution and emerging trends in programming languages, emphasizing key milestones that have shaped their development over time. The study explores the transition from early low-level and assembly languages to high-level procedural languages, followed by the emergence of structured programming and object-oriented paradigms that improved modularity, reusability, and maintainability. Furthermore, the paper examines the rise of modern multi-paradigm programming languages that integrate features from different paradigms to enhance flexibility and developer productivity. Special attention is given to the role of technological advancements in influencing programming language design, including the rapid growth of web technologies, cloud computing, artificial intelligence, and data science. These developments have driven the demand for programming languages that are scalable, efficient, and capable of supporting large-scale and distributed systems. In addition, the study highlights how programming languages continue to evolve in response to industry requirements and developer needs, with a strong focus on simplicity, performance, and ecosystem support. By analyzing both historical evolution and current technological trends, this paper provides a comprehensive understanding of the ongoing transformation of programming languages and their critical role in modern software development.

Keywords: Programming Languages, Evolution of Programming Languages, Programming Paradigms, Software Development Trends, Modern Computing, Multi-paradigm Languages.

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21 Evolution of Artificial Organs

Paper ID V12I2-1173 · Pages 94-98 · Biomedical Sciences

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Artificial organs have been at the frontier of modern excitement in medicine for several reasons: the increasing prevalence of organ failure, limitations to transplantation, and advances in biomedical engineering. In this regard, the following is a concerning overview of artificial organs, including the development materials and technologies, investigations into individual artificial organs, and their wider clinical and technological contexts. Such discussions state that, insofar as artificial organs have many advantages and their limitations and challenges, there is a strong need for these kinds of emerging technologies to meet the enormous healthcare demands that have outpaced supply from donors. The present paper reviews cutting-edge developments and possible futures within the artificial organ research field, particularly focusing on the development of

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bioartificial and hybrid systems combining synthetic components with living biological systems. This review provides an objective overview of where the field stands regarding the development of artificial organs within regenerative and reparative medicine and, more importantly, where it could head in the next couple of decades.

Keywords: Artificial Organs, Bioartificial, Biomaterials, Organ failure, Regenerative medicine.

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22 The Science behind Prosthetics and Advancements in the Field

Paper ID V12I2-1148 · Pages 99-102 · Engineering

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With advances in technology and design and the changing user expectations, lower limb prosthetics have experienced significant changes since the initial introduction of these devices. This paper examines how lower limb prosthetics have changed from simple mechanical devices to modern systems. These changes have been made through research, science, and user-centred design approaches. The paper looks at major areas surrounding the development of prosthetics for lower limbs, which include changes and improvements of materials over the years, design modifications to accommodate movement and comfort, and the ever-increasing impact of digital technology on prosthetic development. Issues related to the affordability, accessibility, and sustainability of lower limb prosthetics are also considered in the context of who benefits from modern-day lower limb prosthetics. Placing the design of lower limb prosthetics in the context of both the technical and social aspects helps to create a clear framework to identify the factors that comprise modern-day lower limb prosthetics and also assists in determining how future innovations in prosthetic technology will further enhance a person's ability to be mobile and independent.

Keywords: Prosthetics, Advancements in Technology, Innovation, Challenges with Access and Cost, Design Modifications.

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23 A Comparative Study of Decentralized Storage Systems: IPFS vs Traditional Cloud Storage

Paper ID V12I2-1186 · Pages 103-107 · Computer Science

Kyrylo Sotnykov, Research Scholar, Independent Researcher

Rapidly expanding amounts of digital data are causing corporations and businesses alike to rely heavily upon cloud storage systems for managing and distributing this increasing amount of data. Traditional cloud storage solutions like Amazon S3 or Google Cloud Storage offer high levels of availability, scalability, and performance via their centralized systems. However, there are concerns about the lack of privacy for data stored in the cloud, too much reliance on one vendor (vendor lock-in), and having only one point of failure. In the last few years, decentralized systems have been developed to address these concerns, taking advantage of a peer-to-peer (P2P) architecture to provide better resiliency and resistance to censorship. This paper presents a comparative analysis of the InterPlanetary File System (IPFS) and traditional cloud storage systems. It evaluates how both systems are architected, compares their performance characteristics and compares the costs of using each type of system. The results of an experimental setup measuring upload and download

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speed for several different file sizes illustrate key trade-offs between centralized versus decentralized storage systems. While cloud storage provides for a higher level of reliability and performance than that provided by IPFS, the authors conclude that IPFS has certain advantages over cloud storage in terms of decentralization and cost-effectiveness. Therefore, hybrid storage models may be the most practical solution for meeting the needs of new modern distributed applications.

Keywords: Decentralized Storage, IPFS (InterPlanetary File System), Cloud Storage, Distributed Systems, Content Addressing.

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24 Are Entrepreneurship Subsidies Effective in Reducing Urban Youth Unemployment?

Paper ID V12I2-1187 · Pages 108-112 · Economics & Finance

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The effectiveness of entrepreneurial subsidies in lowering youth unemployment in metropolitan areas is investigated in this study. Due to growing urbanization, a rise in young people looking for work, and a lack of formal sector job development, urban youth unemployment is still a significant socio-economic issue in many nations. To encourage young people to launch their own firms and become job creators rather than job seekers, governments have implemented a number of entrepreneurship subsidy programs, such as startup grants, low-interest loans, tax incentives, training programs, and mentorship efforts. The study uses secondary data from academic research, government publications, and policy reviews to examine the connection between young employment outcomes and entrepreneurial subsidies. It also looks at the benefits, drawbacks, and variables affecting these programs' efficacy. The study emphasizes that by promoting self-employment and the establishment of small businesses, entrepreneurship subsidies can contribute to a short-term decrease in unemployment. However, a supportive policy framework, market access, mentorship, and commercial acumen are all necessary for their long-term success. The results imply that although entrepreneurship subsidies can support economic growth and job creation, they are unable to address urban young unemployment on their own. Financial mismanagement, inexperience, and market competitiveness are some of the difficulties faced by many subsidized firms. In order to attain sustainable employment results for urban youth, the study suggests that entrepreneurship subsidies should be combined with more comprehensive employment initiatives like skill development, education reform, and improved labor market policies.

Keywords: Entrepreneurship Subsidies, Youth Unemployment, Urban Labor Markets, Youth Entrepreneurship, Self-Employment, Job Creation, Government Support Programs, Economic Development.

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25 Engineering Analysis and Restoration of Go-kart

Paper ID V12I2-1188 · Pages 113-118 · Mechanical Engineering

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This study presents the design, analysis, and fabrication of a lightweight go-kart prototype aimed at achieving optimal performance, safety, and cost effectiveness. The project focuses on key engineering aspects such as chassis design, steering geometry, braking system, and power transmission. A systematic approach was adopted to select suitable materials and components, ensuring structural integrity while minimizing weight. The fabrication process involved precision manufacturing and assembly techniques to meet design specifications. Performance evaluation of the go-kart was conducted based on parameters such as speed, stability, maneuverability, and braking efficiency. The results demonstrate that the developed go-kart meets the desired functional requirements and provides a practical understanding of automotive design principles. This project serves as an effective platform for applying theoretical knowledge to real-world mechanical engineering applications.

Keywords: Chassis, AISI, Go-kart, Material Selection, External Components, Body Improvement.

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26 Improvement Stability of Black Cotton Soil by using Marble Dust and Burnt Brick Powder

Paper ID V12I2-1161 · Pages 119-121 · Civil Engineering

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Black cotton soil is an expansive soil widely found in India, known for its high clay content and significant swelling and shrinkage behavior, making it unsuitable for construction without stabilization. This study focuses on improving its stability and strength using marble dust and burnt brick powder, which are industrial waste materials. Marble dust (rich in calcium carbonate) and burnt brick powder (containing silica and alumina) help form cementitious compounds that enhance soil cohesion, reduce plasticity, and minimize swelling. Laboratory tests such as Atterberg limits, compaction, UCS, and CBR were conducted. Results show significant improvement in strength, density, and load-bearing capacity, providing an economical and eco-friendly solution for construction works.

Keywords: Black cotton soil, Soil stabilization, Marble dust, Burnt brick powder, California Bearing Ratio (CBR).

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27 Improving the Availability and Functional Status of Medical Equipment through a Clinical Audit Cycle: A Quality Improvement Study at Base Hospital Akkaraipattu, Sri Lanka

Paper ID V12I2-1199 · Pages 122-126 · Healthcare

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Improving the Availability and Functional Status of Medical Equipment through a Clinical Audit Cycle: A Quality Improvement Study at a Secondary Care Hospital in Sri Lanka. Background Medical equipment is essential for effective healthcare delivery; however, in low- and middle-income countries, inadequate maintenance systems and weak governance often result in high rates of non-functional equipment. Clinical audit is a recognised quality improvement approach that can identify system gaps and drive measurable improvements. Objective: To assess and improve the availability and functional status of medical equipment through a structured clinical audit cycle. Methods: A full clinical audit cycle was conducted over six months (October 2025–March 2026) at a secondary care hospital in Sri Lanka. The audit included baseline assessment, gap analysis, implementation of targeted interventions, and re-audit. Data were collected using a structured checklist through direct observation, inventory review, and staff interviews. Key indicators included equipment functionality, preventive maintenance, maintenance documentation, and calibration status. Interventions included the introduction of repair tracking systems, preventive maintenance schedules, equipment logbooks, calibration programs, and staff training. Data were analysed using descriptive statistics. Results: A total of 660 medical equipment items were assessed. At baseline, only 61.7% were fully functional, while preventive maintenance (15.6%), maintenance documentation (17.0%), and calibration (4.3%) were markedly deficient. Following interventions, functionality improved to 91.8% (absolute increase: +30.1%), exceeding the ≥90% standard. Preventive maintenance increased to 92.4% (+76.8%), maintenance documentation to 94.5% (+77.5%), and calibration to 73.6% (+69.3%). The proportion of non-functional equipment decreased from 32.5% to 5.5%, with substantial reductions in repair delays. Conclusion: Structured, low-cost interventions implemented through a clinical audit cycle significantly improved medical equipment functionality and management. Clinical audit is an effective strategy for strengthening health technology management systems in resource-limited settings.

Keywords: Clinical Audit, Medical Equipment, Quality Improvement, Health Technology Management, Sri Lanka.

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28 What are the Implications of Using Deep Brain Stimulation to Treat and Improve Symptoms of Depression?

Paper ID V12I2-1201 · Pages 127-132 · Neurosciences

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Neuroscientific practice is constantly evolving, improving, and developing. Recent research has introduced novel methods to treat pressing conditions which have affected the human population for many decades. This paper delves into the potential of a stimulation technique- deep brain stimulation- to treat the symptoms of a mood disorder as complex and convoluted as depression. Overall, 5 domains were considered, including: an overview of the diagnostic factors of depression, the biological causative factors for depression, current

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treatment opportunities, the mechanism of DBS and its application to treating depression, and finally, the ethical and social implications of implementing DBS as a mainstream form of treatment for cases of extreme depression. Before its utilisation in mainstream practice, the ethical implications, as well as clinical trials assessing the true long-term impacts of such treatment, must be evaluated. How far should the brain be manipulated in order to treat depression, and how could this impact autonomy and patient safety? Across the literature reviewed, DBS serves as a viable and credible means for relieving symptoms of depression and poses a great potential to improve the lifestyle of treated patients, which is ultimately the desired outcome of a neuroscientific endeavour such as this one.

Keywords: Deep Brain Stimulation, Treatment-Resistant Depression, Neuromodulation, Mood Disorders, Nucleus Accumbens, Neuroethics, Psychiatric Treatment, Neural Circuitry.

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29

JobPilot: AI-Powered Autonomous Job Application Agent

Paper ID V12I2-1203 · Pages 133-137 · Education Technology

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In the modern, highly competitive employment environment, job seekers find the lengthy time and effort spent in the manual search for job applications and completion of repetitive forms on various online sites problematic. This is one labour-intensive undertaking, not only tiresome but often leads to lost opportunities and a lack of motivation. The current job platforms usually have low automation, whereby the user does most tasks related to the application process. To eliminate such inefficiencies, we suggest an autonomous job application agent that is powered by AI and fully automates the job search and application agent that fully automates the job search and application workflow. The basic building blocks of this system are advanced Large Language Models (LLMs) that can sensitively search user resumes against the available job advert and provide answers to application questions based on the context. Examples of automation tools used by the agent to fill in and submit application forms include Puppeteer and Selenium, which can run smoothly in the cloud, also adding to the convenience of users by monitoring the applications submitted by them, in order to receive timely email notifications and be confident of a secure authentication process using Firebase. Unlike the conventional solutions, the proposed agent can work independently even when the users are not online by providing intelligent resume analysis, streamlining the job application process, and making it quicker, simpler and more effective for the user. Our system will position the future of automated career management through the reduction of manual work, the maximum possible number of successful placements, and convenience for user privacy.

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Keywords: Autonomous Job Application System, AI Recruitment, Web Automation, Selenium WebDriver, Large Language Models, Lang Chain, Google Gemini, Resume Parsing, Intelligent Job matching, Automation Agent.

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30 Thermocol (EPS) Insulated Concrete Forms

Paper ID V12I2-1193 · Pages 138-139 · Civil Engineering

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The demand for sustainable, energy-efficient, and durable construction systems has increased significantly in recent decades. Conventional brick masonry and reinforced cement concrete (RCC) walls, although widely used, often fail to deliver optimum thermal comfort, sound insulation, and speed of construction. Insulated Concrete Forms (ICFs) represent a modern alternative that combines structural and insulation benefits into a single system. In this system, hollow blocks or panels made of Expanded Polystyrene (EPS), also known as Thermocol, are assembled as permanent formwork. Reinforcement is inserted inside, and concrete is poured into the hollow core, producing a monolithic structural wall with superior thermal and acoustic insulation. This report presents a comprehensive study of Thermocol (EPS) ICF technology, covering its background, materials, construction process, structural properties, applications, advantages, limitations, and case studies. A literature review highlights the successful implementation of ICFs in North America, Europe, and Japan for energy-efficient and disaster-resistant housing. However, in India, the technology is still in its infancy, with limited awareness and adoption. Supporting data and comparative analysis suggest that ICFs can reduce construction time by 30–40%, cut energy consumption for heating/cooling by 40–60%, and significantly improve comfort levels. The report concludes that EPS ICFs provide a viable solution for sustainable urban development, aligning with initiatives like Smart Cities Mission and green building certification programs. The challenges of cost and skilled labor can be overcome through policy support, training, and indigenous manufacturing. Hence, Thermocol Insulated Concrete Forms are an innovative step toward the future of construction

Keywords: Reinforcement Cement Concrete (RCC), Insulated Concrete Forms (ICF), Thermocol (EPS).

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31 Analysis of Deburring and Edge Finishing

Paper ID V12I2-1204 · Pages 140-144 · Mechanical Engineering

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Deburring is a vital finishing operation in modern manufacturing processes that involves the removal of unwanted material projections, commonly referred to as burrs, from machined components. Burrs are typically

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formed during machining operations such as drilling, milling, turning, and grinding due to plastic deformation of the material. These projections, although small, can significantly affect the functionality, safety, and aesthetic quality of the final product. This research paper presents a detailed study of deburring, including its definition, causes, and classification of burrs. Various deburring methods, such as manual, mechanical, thermal, electrochemical, and cryogenic processes, are discussed in detail. The paper also explores tools and equipment used, advantages and limitations, industrial applications, and future advancements. The study highlights the importance of deburring in ensuring high-quality production and improving the performance and reliability of manufactured components.

Keywords: Deburring, Material removal, Tool, Milling, Modern Manufacturing.

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32 Bamboo as A Sustainable Material

Paper ID V12I2-1206 · Pages 145-147 · Civil Engineering

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Bamboo has emerged as a highly promising sustainable material due to its rapid growth rate, renewability, and minimal environmental impact. As a natural resource, bamboo demonstrates excellent mechanical properties, including high tensile strength, flexibility, and durability, making it suitable for a wide range of engineering and construction applications. Compared to conventional materials such as steel, concrete, and timber, bamboo requires significantly less energy for processing and contributes to reduced carbon emissions, thereby supporting global sustainability goals. Additionally, its biodegradability and ability to sequester carbon enhance its role in mitigating climate change. Recent advancements in engineered bamboo and composite technologies have further expanded its usability in modern infrastructure and product design. This paper explores the properties, applications, and environmental benefits of bamboo as a sustainable material, highlighting its potential to replace non-renewable resources and promote eco-friendly development.

Keywords: Bamboo, Sustainable Materials, Engineered Bamboo, Life Cycle Assessment, Green Construction, Natural Fiber Composites, Structural Performance.

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33 Colour as Visual Language: A Study of Cinematic Colour Theory and Audience Perception

Paper ID V12I2-1174 · Pages 148-154 · Media Studies

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Colour plays a significant role in cinema as a visual tool that communicates emotion, meaning, and narrative intent. Rather than functioning only as an aesthetic element, colour operates as a form of visual language that

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influences audience perception and psychological response. This research paper examines how colour theory is applied in cinema to shape mood, convey character psychology, and support storytelling. The study draws upon theoretical perspectives from colour psychology and film studies, along with an analysis of historical developments in cinematic colour usage. The paper explores how filmmakers use specific colour palettes and contrasts to evoke emotional responses and guide audience interpretation. Case studies from selected films, including the works of Anurag Kashyap and Disney animated cinema, are used to demonstrate how colour functions as a narrative device across different cinematic contexts. In addition, the study considers the role of colour in movie poster design to highlight how visual marketing also relies on colour to communicate tone and genre. Through qualitative analysis of visual examples and existing literature, this research finds that colour consistently functions as a powerful storytelling tool that enhances emotional engagement and strengthens narrative meaning. The findings suggest that understanding colour as a visual language contributes to a deeper appreciation of cinema and its ability to influence how audiences experience and interpret films.

Keywords: Colour Theory, Cinema, Visual Language, Audience Perception, Colour Psychology, Film Aesthetics.

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34 Social Media Addiction and Its Impact on Teenage Mental Health

Paper ID V12I2-1183 · Pages 155-158 · Media Studies

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This research paper has examined the impact of social media on teenage mental health, how it affects their physical, mental and emotional well-being. Social media being a routine part of their day has led to addiction, depression, anxiety, fear of missing out, body image issues, etc. Cyberbullying is marked to be one of the major concerns, as teenagers are easy targets and often hesitate to seek help. Additionally, the paper discusses the negative impact of social media on daily life, sleep patterns, academics, attention span, body image issues and overall health due to excessive screen time and blue light exposure. Moreover, social media can also be used positively if used mindfully. The paper discusses coping mechanisms, mindful usage and how digital detox plays a crucial role in teenagers' daily life.

Keywords: Teenage Mental Health, Impact of Social Media, Cyber Bullying, Body Image Issues, Screen Time, Blue Light Exposure, Digital Detox, Mindful Usage of Social Media.

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35 A Comparative Study of Steer-by-Wire and Conventional Steering Systems in Autonomous Vehicles

Paper ID V12I2-1212 · Pages 159-165 · Automotive Engineering

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The current trends within the automotive industry hint towards a shift into Steer-by-wire (SbW) powered steering systems in automobiles. This technology is aimed at replacing the previous mechanical steering systems and promising improvements in vehicle longevity, performance bumps, improved handling, and easier integration with artificial intelligence-driven self-driving (automated) cars. However, the novelty of this

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technology requires an understanding of its current state of development and deeper knowledge into the extent to which it can replace mechanical steering vehicles. This paper aims to review the current state of Steer-By-Wire (SbW) and analyse it across the parameters that the technology must excel in before SbW is introduced to the mass production of self-driving cars. Moreover, this study will also analyse the current drawbacks of an SbW system and how these can be further polished to achieve desirable outcomes. The paper will provide an insight into how well SbW is really suited for taking on self-driving cars and the true capabilities of the technology driving the system.

Keywords: Autonomous Cars, Mechanical Steering, Sensors, Steer-By-Wire System, Electric Power Steering, Vehicles.

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36 Developing Eco-friendly Concrete Using Plastic and E-Waste Aggregate

Paper ID V12I2-1218 · Pages 166-168 · Civil Engineering

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The rapid increase in plastic and electronic waste has created significant environmental and disposal challenges worldwide. This study investigates the potential use of waste plastic and e-waste materials as partial replacements for natural aggregates in concrete to develop a sustainable and eco-friendly construction material. The waste materials were collected, cleaned, and processed into suitable sizes before being incorporated into concrete mixes at varying proportions. Experimental evaluation was carried out to study the effects on key properties such as compressive strength, tensile strength, density, and durability. The results indicate that the inclusion of plastic and e-waste aggregates reduces the overall weight of concrete while maintaining satisfactory strength for non-structural applications. Additionally, the use of these waste materials contributes to reduced consumption of natural resources and minimizes environmental pollution caused by improper disposal. The study demonstrates that such innovative material substitution can offer a practical solution for sustainable construction while supporting effective waste management practices.

Keywords: Eco-Friendly Concrete, Plastic Waste Utilization, E-Waste Recycling, Sustainable Construction, Lightweight Concrete, Compressive Strength.

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37 GSM Based Elderly Health Monitoring System

Paper ID V12I2-1222 · Pages 169-175 · Biomedical Engineering

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The increasing need for continuous health monitoring among elderly people has led to the development of

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smart healthcare systems. This paper presents a GSM-based elderly health monitoring system designed to track vital parameters such as body temperature, heart rate, and oxygen saturation (SpO_2) in real-time. The system uses biomedical sensors integrated with a microcontroller to collect patient data and transmit it through GSM technology to caregivers or medical professionals. In case of abnormal readings, the system automatically sends alert messages, ensuring immediate attention and reducing health risks. This solution is cost-effective, portable, and easy to use, making it suitable for home-based healthcare monitoring. The proposed system enhances patient safety, supports remote monitoring, and reduces the need for frequent hospital visits.

Keywords: GSM, Elderly Care, Health Monitoring, Sensors, Remote Monitoring.

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38 Psychological Interventions for Children Having Dyscalculia and Dysgraphia

Paper ID V12I2-1227 · Pages 176-182 · Psychology

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In most schools, one may come across a distinct set of students who struggle with learning. These issues can be discovered in their acquisition of fundamental knowledge. Reading, writing, and arithmetic are examples of academic talents. The condition in which a learner struggles to acquire the fundamental abilities required for learning is known as a learning disability. This paper aims to identify interventions for these disabilities and help prevent them at an early age.

Keywords: Dyscalculia, Learning Disabilities, Intervention, Early Intervention, Therapy, Dysgraphia.

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39 How are AI Advancements Supporting People with Learning Disabilities to Achieve their Maximum Potential?

Paper ID V12I2-1228 · Pages 183-187 · Ai And Education

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Artificial Intelligence (AI) advancements are significantly transforming educational accessibility and learning outcomes for individuals with learning disabilities. Students with conditions such as dyslexia, dyscalculia, speech impairments, autism spectrum disorder, and other cognitive challenges often experience difficulties in traditional learning environments that rely on standardized teaching approaches. AI technologies are increasingly being used to create personalized, adaptive, and inclusive learning environments that better address the diverse needs of these learners. AI-based assistive technologies have also significantly improved accessibility in education. Tools such as text-to-speech (TTS), speech-to-text (STT), predictive text systems, and AI-driven writing assistants help students with dyslexia and other learning disorders improve reading, writing, and spelling abilities. Similarly, adaptive algorithms are being used for early detection and intervention in conditions such as dyscalculia by analyzing students' performance in mathematical tasks and providing targeted support. AI technologies also support students with speech and communication impairments through speech recognition systems, speech-generating devices, and even automatic sign language recognition systems. Overall, AI advancements have the potential to revolutionize special education by providing

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personalized learning opportunities, improving communication and accessibility, and enabling individuals with learning disabilities to achieve their maximum potential. Another important aspect highlighted in this study is the growing role of AI as a supportive learning companion for students with learning disabilities. By providing real-time assistance, personalized feedback, and adaptive learning pathways, AI tools allow students to engage with educational content in ways that suit their individual abilities and preferences. As AI continues to evolve, its integration into educational systems has the potential to create more inclusive learning environments where students with learning disabilities can actively participate, develop their skills, and reach their academic and personal goals more effectively.

Keywords: Artificial Intelligence, Learning Disabilities, Inclusive Education, Adaptive Learning Platforms, Assistive Technology, Dyslexia, Dyscalculia, Speech Recognition Technology, Text-to-Speech (TTS), Speech-to-Text (STT), Natural Language Processing, Universal Design for Learning (UDL), STEM Accessibility, Special Education Technology, Educational Personalization.

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---

40 The Theory and Practice behind Workplace Behaviour

Paper ID V12I2-1229 · Pages 188-193 · Management Studies

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This paper delves into organizational behaviour which is the study of how individuals and groups act within the organization. It explores the evolution of organizational behaviour from classical management theories, which emphasise structure, efficiency and control, to modern approaches that highlight human motivation, psychological factors and relationships. Key theoretical approaches include classical theory, human relations movement and Contemporary systems. The paper also articulates the role of motivation, personality and group dynamics in organizational effectiveness. The findings from the literature prove that there must exist a balance between technological advancements and human-focused practices to ensure long-term success.

Keywords: Organizational Behaviour, Motivation, Organizational Structure, Artificial Intelligence, Self Determination.

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41 Tracking System for E-commerce Product

Paper ID V12I2-1224 · Pages 194-199 · Information Technology

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The proliferation of aggressive dynamic pricing strategies within contemporary e-commerce platforms has fundamentally altered consumer purchasing environments. These algorithmic pricing models, driven by real-time market shifts, inventory levels, and competitor actions, generate significant price volatility, leading to inherent information asymmetry. Consumers frequently lack access to crucial historical price trajectories and

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comprehensive cross-platform comparisons, resulting in suboptimal purchasing decisions, missed financial opportunities, and diminished overall market transparency. To mitigate this systemic challenge, this paper presents the design and implementation of a robust E-commerce Price Tracker System. The proposed architecture utilizes a Python-based backend to perform scheduled, real-time data aggregation through integration with external e-commerce APIs, such as Keepa for Amazon and dedicated interfaces for other major retailers. All fetched price points and associated metadata are meticulously timestamped and persistently archived within a scalable NoSQL repository (Firebase Real-time Database or Firestore), thereby establishing a reliable time-series dataset suitable for rigorous longitudinal analysis.

Keywords: Dynamic Pricing, Time-Series Analysis, E-Commerce Data Acquisition, Cross-Platform Comparison, Consumer Information Asymmetry, Real-Time Monitoring, Data Visualization, Purchase Recommendation Systems.

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42 Effects of Minefields on Livelihood Access of Resettled Internally Displaced Persons IDPs in Borno State, Nigeria

Paper ID V12I2-1234 · Pages 200-203 · Geography

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Minefields remain significant threats to civilian populations in post-conflict regions, particularly in areas affected by insurgency. This study examines the impact of minefields on the socio-economic activities of resettled Internally Displaced Persons (IDPs) in selected Local Government Areas of Borno State, Nigeria. The study adopted a mixed-methods approach involving household surveys, Key Informant Interviews (KIIs, and Focus Group Discussions (FGDs). A total of 384 questionnaires were administered to resettled IDPs, while geospatial analysis was used to map landmine and ERW hotspot areas. Descriptive statistics, spatial analysis, and inferential statistics were used for data analysis. The findings reveal that landmine and ERW incidents are concentrated in areas such as Gwoza, Bama, Jere and Kaga Local Government Areas. The presence of explosive hazards has significantly restricted agricultural activities, movement, and livelihood opportunities among resettled IDPs. Risk perception analysis shows that most respondents perceive landmines and ERW as a major threat to their safety and economic recovery. The study concludes that landmine contamination continues to hinder sustainable resettlement and economic recovery in post-conflict communities. The study recommends intensified mine clearance operations, improved mine risk education, and livelihood support programmes for affected populations.

Keywords: Minefields, Landmines, Explosive Remnants of War, IDPs, Socio-Economic Activities, Post-Conflict Recovery.

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43 Design and Development of a Portable Generator Using Scrap Materials

Paper ID V12I2-1223 · Pages 204-207 · Mechanical Engineering

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The rapid growth of small and medium-scale industries has increased the demand for compact, efficient, and cost-effective internal material-handling solutions. Traditional manually operated trolleys cause significant operator fatigue, reduced productivity, and safety risks when transporting loads above 150 kg. This paper presents the design, development, and experimental validation of an electric material handling cart powered by a 500 W BLDC motor, a dual-mode BLDC controller, and a 48 V, 10 Ah Genesys battery system. The cart is constructed on a robust stainless-steel chassis with optimized dimensions of 1200 mm × 1000 mm × 500 mm, supported by a CNC-machined drive axle, differential mechanism, and 17-inch pneumatic wheels. A chain–sprocket reduction drive provides high starting torque for industrial loads between 200–250 kg and ramp climbing up to 5%. Extensive field testing—including load trials, gradient climbing, structural assessment, runtime evaluation, braking tests, and narrow-corridor maneuverability checks—validated the system's performance. The cart demonstrated a mixed-duty runtime of approximately 50 minutes and a controlled braking distance of 0.35 m, confirming theoretical predictions. Results confirm that the developed electric cart offers a reliable, zero-emission, and ergonomically superior alternative to manual material handling, making it highly suitable for warehouses, workshops, and confined industrial environments.

Keywords: Portable Generator, Scrap Material Utilization, Electromagnetic Induction, Small-Scale Power Generation, Energy Efficiency, Sustainable Engineering, Cost-Effective Design.

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44 How Effective is Origami as a Pedagogical Tool for Teaching Geometric Concepts Compared to Traditional Methods

Paper ID V12I2-1231 · Pages 208-210 · Mathematics

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This review paper examines the effectiveness of origami as a pedagogical tool for teaching geometric concepts in comparison to traditional instructional methods. Geometry is often perceived as abstract and difficult for students to grasp through conventional approaches that rely heavily on definitions and rote learning. In response, educators have explored origami as a hands-on and visual strategy to enhance understanding. This paper analyses multiple teaching approaches that incorporate origami, including algorithmic instruction, language-based methods, collaborative learning, and problem-solving frameworks. The findings suggest that origami can significantly improve conceptual understanding, spatial reasoning, and student engagement when implemented with clear pedagogical intent. In particular, approaches that integrate discussion, reasoning, and mathematical language are found to be the most effective. However, the review also identifies limitations, including the lack of long-term empirical evidence and the dependence on teacher expertise. Overall, origami emerges as a flexible and powerful instructional tool that, when thoughtfully applied, can make geometry more

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accessible, interactive, and meaningful for learners.

Keywords: Origami-Based Learning, Geometry Education, Spatial Reasoning, Mathematical Communication, Experiential Learning, Problem-Solving.

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45 Development of Green Concrete using Agricultural Waste Ashes (Rice Husk Ash and Sugarcane Bagasse Ash) as Partial Cement Replacement

Paper ID V12I2-1236 · Pages 211-219 · Green Concrete Technology

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The construction industry is rapidly expanding, resulting in increased cement consumption and substantial environmental problems due to greenhouse gases. To mitigate this problem, it is critical to use sustainable and alternative building materials. Agricultural waste materials such as Rice Husk Ash (RHA) and Sugarcane Bagasse Ash (SCBA) are viable sources of supplementary cementitious materials because they are abundant, environmentally friendly, and exhibit pozzolanic properties. This study characterizes RHA and SCBA for use in concrete mixtures. The study conducts analyses of the chemical and physical properties of RHA and SCBA in order to determine their reactivity, compatibility with cement, and overall behavior in concrete mixtures. The study conducts an analysis of the chemical characterization (i.e., silica content, pH, carbonate content and iron content) and physical characterizations (i.e., specific gravity and fineness) of RHA and SCBA to determine the effect on concrete mixtures. In addition, the study conducted workability tests (slump test) of green concrete with 10% total cement replacement for 5% of each RHA and SCBA. The study findings indicate that both RHA and SCBA exhibit high levels of silica and are highly alkaline, suggesting both materials have excellent pozzolanic properties. The physical properties indicate that both RHA and SCBA have much lower densities and finer particle sizes that improve microstructure and particle packing. The workability of the concrete containing both RHA and SCBA showed a slump of 75 mm, indicating a medium level of workability, which is acceptable for practical use. Overall, the study findings indicate that RHA and SCBA are viable and sustainable substitutes for conventional cement materials and that the use of these two materials can help reduce the negative impacts of cement on the environment and improve resource conservation.

Keywords: Green Concrete, Rice Husk Ash (RHA), Sugarcane Bagasse Ash (SCBA), Synergetic Effect, Workability.

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46 Hack Hub

Paper ID V12I2-1233 · Pages 220-225 · Automation

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Hackathons have become an essential part of technical education, encouraging students to apply their knowledge, enhance problem-solving skills, and work collaboratively in teams. However, many students face challenges while participating in hackathons, such as difficulty in finding suitable team members, lack of awareness about peers' skills, limited interaction across different classes or departments, and hesitation among introverted students to communicate openly. These challenges often lead to poor team formation or discourage students from participating in hackathons altogether. To overcome these issues, this project proposes a Hackathon Collaboration Website designed specifically for college students. The platform functions as a professional networking system similar to LinkedIn but focuses exclusively on hackathon-related collaboration. The website allows users to register, create detailed profiles, list their technical and nontechnical skills, share posts related to hackathon ideas, like and comment on posts, and communicate with other students through a chat feature. This helps students identify peers with similar interests and complementary skills, enabling effective team formation. The system is developed using HTML and CSS for the frontend interface, PHP for server-side processing, and MySQL (phpMyAdmin) for database management. The platform ensures secure data handling, easy accessibility, and a userfriendly interface. By providing a structured and centralized environment for interaction, the proposed system enhances collaboration, increases student participation in hackathons, and promotes inclusive teamwork within the college.

Keywords: Hack Hub, Hackathon Platform, Student Collaboration, Web-Based System, Project Management, Team Formation, Peer Learning, Skill Development, Innovation Platform, College Ecosystem, Online Learning, Developer Community, Realtime Collaboration, Event Management System, Beginner-Friendly Platform, Technical Education, Software Development, Knowledge Sharing, Campus Networking, Collaborative Learning.

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47 Smart IoT Based Battery Management System for EV Battery

Paper ID V12I2-1239 · Pages 226-228 · Electricals And Electronics Engineer

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Advanced battery management is now essential for lifetime and safety due to the quick spread of lithium-ion batteries in electric cars and renewable energy systems. Static hardware thresholds are usually used by traditional battery management systems (BMS) to guard against overvoltage, undervoltage, and overcurrent. Although these static methods work well for simple defects, they frequently fail to anticipate compounding

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stress elements that cause thermal runaway or cell deterioration. The design and implementation of a sophisticated, Internet of Things-enabled BMS for a 3S (11.1V) Lithium-ion battery pack is shown in this study. It integrates real-time telemetry with an edge-computed Machine Learning (ML) algorithm. The system accomplishes high-fidelity sensing by using a 16-bit ADS1115 Analogue-to-Digital Converter and an ESP8266 microprocessor dynamic "Risk Score" is continually computed by a Logistic Regression model using voltage, current, temperature, State of Charge (SoC), and State of Health (SoH). The system has a multi-tiered protection procedure that includes a physical relay cutoff during critical stages and a nonblocking audio warning during medium-risk conditions. Additionally, the BMS transmits telemetry to the ThingSpeak cloud platform in its capacity as a smart-grid edge device. The dependability and remote observability of energy storage systems are greatly improved by this predictive method, as demonstrated by experimental data.

Keywords: Internet of Things (IoT), Machine Learning, Logistic Regression, Lithium-Ion, Edge Computing, Battery Management System (BMS).

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48 Design and Development of a Smart Drug Delivery System Using IoT

Paper ID V12I2-1241 · Pages 229-229 · Bio Medical Engineering

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This paper presents the design and development of a smart drug delivery system using Internet of Things (IoT) technology. The system ensures accurate and timely drug administration by integrating sensors, microcontrollers, and wireless communication. It improves patient safety, medication adherence, and remote monitoring by healthcare professionals.

Keywords: IoT, Smart Drug Delivery, Biomedical Devices, Sensors, Healthcare Monitoring.

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49 FinTrack – A Finance Tracker

Paper ID V12I2-1242 · Pages 230-233 · Computer Science & Engineering

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Managing personal finances effectively has become essential in today’s fast-paced digital environment, where individuals often face difficulty in tracking their income and expenses systematically. This paper presents FinTrack – A Finance Tracker, a web-based application designed to simplify and improve personal financial management. The system is an enhanced continuation of the previously developed “Expenzo” project, redesigned with improved usability, efficiency, and performance. FinTrack enables users to record daily transactions, categorize expenses, and monitor income in a structured manner, helping them maintain better financial discipline. It also provides budgeting functionality, allowing users to set spending limits and evaluate their financial behavior against predefined goals. To support better decision-making, the system offers visual insights through charts and summarized reports, making financial patterns easier to understand. The application is developed using Python with the Flask framework for backend operations, ensuring efficient handling of user requests and data processing, while SQLite is used as a lightweight and reliable database for storing user information securely. The frontend is built using HTML, CSS, and Bootstrap to deliver a responsive and user-friendly interface across multiple devices. Additionally, secure authentication mechanisms are implemented to protect user data and maintain privacy. The results indicate that FinTrack helps users gain better control over their finances by promoting awareness and organized tracking. The system is especially beneficial for students and working professionals seeking a simple yet effective solution for managing daily expenses, with future scope including advanced analytics, AI-based predictions, and integration with modern digital payment platforms.

Keywords: Expense Tracking, Budget Planning, Income Monitoring, User-Friendly Interface, Digital Expense Manager, Personal Budgeting Tool.

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50 Understanding Popular Music: What Makes it Catchy?

Paper ID V12I2-1163 · Pages 234-237 · Cognitive Neuroscience

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Music is an emotional stimulus that reflects important human psychology of the listener based on their taste. It can also reveal the emotional state of humanity by referring to the most played or popular songs. It imprints on listeners a memory, which, if it is pleasing to the brain, tends to get replayed. This replay of a song in the brain is almost always a certain part of the song, known as the hook, and is known as an "earworm." Earworms are

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generally caused by a piece of music played by the listener that sounds catchy or intriguing to the brain. The purpose of this paper is to understand and analyse what features of a certain music piece influence its catchy quality, whether it is based on the lyrics, the melodies, the synth or acoustic quality, the gender of the artist, or a music video and various other factors. It does so by analysing the number of streams that a particular song has received, which shows the number of times people have listened to it due to its catchy nature.

Keywords: Earworms, Hook, Catchy, Popular Music, Impact of Music on Human Psychology.

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51 Wearable IoT-Based Real-Time Arrhythmia Detection and Cardiac Risk Prediction System Using Machine Learning

Paper ID V12I2-1172 · Pages 238-239 · Iot System

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Cardiovascular diseases are among the leading causes of death across the world. Early detection of heart abnormalities such as arrhythmia can significantly reduce the risk of severe complications and improve patient survival rates. Arrhythmia refers to irregular heartbeats that may be too fast, too slow, or irregular. Continuous monitoring of heart signals can help identify such abnormalities at an early stage. This project proposes a wearable Internet of Things-based system for real-time arrhythmia detection and cardiac risk prediction using machine learning techniques. The system uses wearable sensors to continuously collect electrocardiogram signals and other physiological parameters from the user. These signals are transmitted through IoT communication technologies to a processing platform where machine learning algorithms analyze the data. The proposed system aims to detect abnormal heart rhythms in real time and alert patients or healthcare providers immediately. By integrating wearable devices, IoT communication, and machine learning analysis, the system supports remote healthcare monitoring and early diagnosis. This technology can improve patient safety, reduce hospital visits, and support preventive healthcare solutions.

Keywords: Wearable Devices, Internet of Things (IoT), Arrhythmia Detection, Cardiac Risk Prediction, Machine Learning, Electrocardiogram (ECG) Monitoring, Real-Time Health Monitoring.

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52 The Promise of Xenotransplantation

Paper ID V12I2-1235 · Pages 240-245 · Biological Studies

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Xenotransplantation is emerging as an innovative solution to the global organ shortage crisis, where the demand for transplants far exceeds the supply. This paper explores the historical need for an alternative source for allotransplantation and examines the key organs in play for such a transplant. It highlights the

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immunobiological barriers that challenge such a process, along with the risks of zoonotic disease transmission and the safety protocols to address them. Overall, the research findings prove that xenotransplantation presents a promising yet complex approach that could redefine modern medicine.

Keywords: Xenotransplantation, Cells, Tissues, Organs, Genetically Modified Animals, Groundbreaking, Innovative.

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53 Narcissistic Personality Disorder: An Overview

Paper ID V12I2-1248 · Pages 246-252 · Psychology

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The following paper aims to provide an overview of ‘Narcissistic Personality Disorder’ (NPD). It endeavors to do the same by covering the disorders various aspects, starting by exploring the terms mythological origins, the evolution of the definition and usage of the term, as well as psychoanalytic contributions. The paper then moves on to the various subtypes of the disorder as categorized by various theorists, followed by the diagnostic criteria and differential diagnosis as written in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR). The contributions and theories of Otto Kernberg and Heinz Kohut have also been touched upon, along with the treatment methods and therapeutic approaches used in clinical settings to treat NPD. Finally, the paper concludes with the topics of the societal impact of NPD and also briefly talks about the hypothesis of a ‘narcissism epidemic’.

Keywords: Narcissism, Narcissistic Personality Disorder, NPD, Psychoanalysis, Pathological Narcissism, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition - Text Revision (DSM-5-TR), Grandiosity, Comorbidity, Transference, Countertransference, Narcissism Epidemic.

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54 FindMyStuff – An Automated Lost and Found Management System

Paper ID V12I2-1255 · Pages 253-258 · Computer Science And Engineering

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FindMyStuff is an automated, centralized web-based platform developed to address the inefficiencies of traditional lost-and-found systems within university campuses. Conventional methods, such as physical notice boards and scattered social media groups, lack structured organization, searchability, and data persistence, resulting in low recovery rates of misplaced items. The proposed system introduces an intelligent and systematic approach to asset recovery through the implementation of a heuristic matching algorithm. This algorithm automatically links “Lost” and “Found” reports by analyzing key parameters such as item category, textual similarity, location tags, and temporal proximity. The platform is designed using modern web technologies, including ReactJS and Tailwind CSS for the frontend, and Django with Django REST Framework for

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the backend, ensuring scalability, responsiveness, and cross-platform compatibility.

Keywords: Automated Matching Algorithm, Campus Asset Recovery, Heuristic Search, Cloud Image Hosting, Web-based Portal.

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55 Detecting Misinformation in News Using BERT and Natural Language Processing

Paper ID V12I2-1258 · Pages 259-265 · Machine Learning

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The widespread use of social media and online news platforms has made it easier for misinformation and fake news to spread rapidly. This creates serious challenges for individuals and organizations that rely on accurate information. To address this problem, this study proposes a fake news detection system that combines Natural Language Processing (NLP) techniques with both traditional machine learning and transformer-based models. The dataset used for the study is derived from the WELFake dataset, containing labeled news articles categorized as real or fake. Text preprocessing techniques such as tokenization, removal of noise, and normalization are applied to prepare the data. Traditional models like Support Vector Machine (SVM) and LightGBM use TF-IDF features to capture important word patterns, while DistilBERT is used to understand contextual meaning in text. The results show that transformer-based models achieve higher accuracy, while traditional models remain efficient and reliable. This hybrid approach improves the overall effectiveness of fake news detection systems.

Keywords: Fake News, WELFake dataset, DistilBERT, Support Vector Machine, LightGBM, TF-IDF.

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56 News-Aware Stock Market Movement Prediction for India Retail Traders

Paper ID V12I2-1256 · Pages 266-271 · Financial Technology

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Generally, retail investors have been experiencing various difficulties in handling financial markets due to the impact of ever-changing price movements in conjunction with ever-changing financial news. In normal circumstances of trading mechanisms, it is possible to observe historical price movements or sentiments. However, it is not possible to observe the contextual relationship between financial news and financial markets. Such cognitive complexities always affect decision-making in an unfavorable manner. In order to bridge the knowledge gap in this regard, this paper proposes the idea of developing a trading interpreter that considers

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financial news sentiments and financial market price data in an integrated manner. Natural language processing techniques have been used for developing a system that extracts sentiments from financial news articles. Sentiments are mapped with structured financial market price intervals. Feature engineering techniques have been used for developing financial news sentiments, price-based feature development, and interaction feature development that considers immediate reactions and lagged reactions of financial markets with respect to financial news

Keywords: Financial Sentiment Analysis, Stock Market Prediction, Natural Language Processing, Trading Decision Support, Market Price Analysis, Web-Based Trading System, Predictive Analytics.

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57 Feminova – New Era of Women’s Health

Paper ID V12I2-1259 · Pages 272-278 · Healthcare

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Abstract: Feminova - A New Chapter in Women's Health. The new women's health app, Feminova, opens a window to women's health through a digitally designed environment for actual day-to-day use. Logging assures the perfect blend of easy and safe personal entry. Cycle information is organized correctly - in a tracker that over time understands the rhythm, shift, and pattern. Rather than relying on estimation, users are informed of the potential start days of the period and ovulation phases based on recorded dates. A clever assistant is embedded in the app, LLaMA2-powered and functioning offline to maintain the privacy of conversations. No internet search is required for body changes explanations. Misconceptions? They disappear more quickly when the facts are presented straightforwardly without the drama. Selected articles, not inundated ones, each one related to the health issues that women encounter, are accessible. Physical activity recommendations demonstrate that even minimal alterations in posture or everyday habits can lead to less pain. Support is readily available, and crisis numbers are present with one click if things get out of hand. In connection with the local community, the system stores users' data securely in a private data vault. Feminova, a product of smart learning mechanisms coupled with internet resources, is evidence of the amalgamation of technology with the personalized women's care of today's generation.

Keywords: Women’s Health, FemTech, Menstrual Cycle Tracking, Period Prediction, Ovulation Prediction, LLaMA2 Chatbot, Offline AI Assistant, Artificial Intelligence, Machine Learning, Predictive Analytics, Digital Health Platform, Reproductive Health, Health Pattern Recognition, Personalized Healthcare, Data Privacy, Secure Login, Local Data Storage, Myth Busting, Health Education, Lifestyle Recommendations, Crisis Support System, Digital Wellness, Smart Healthcare Solutions.

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58 A Proof-Carrying Medical Legal Right Advisor where Natural Language Generation is Intentionally Non-Intelligent

Paper ID V12I2-1266 · Pages 279-284 · Natural Language Generation

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This paper presents PC-MLRA (Proof-Carrying Medical-Legal Rights Advisor), a deterministic system designed to provide structured awareness of patient rights and professional ethics in medical contexts. The system maps user queries to legally grounded responses through a fixed, rule-based pipeline without machine learning or generative language models. Responses are generated using predefined templates linked to a static legal knowledge base derived from the NHRC Charter of Patients' Rights (2019) and the IMC Ethics Regulations (2002). Each output can include a structured proof trace that records the matched intents, activated clauses, and template selection, enabling auditability and reproducibility. The system is evaluated with respect to determinism, legal clause coverage, trace completeness, and safety under ambiguous queries.

Keywords: Medical-Legal Rights Awareness, Deterministic Systems, Proof-Carrying Systems, Rule-Based Classification, Template-Based Generation, Patient Rights, Medical Ethics, Auditability, Safety-Critical AI.

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59 CAMPULSE – A Platform Connecting Students, Events & Achievements

Paper ID V12I2-1274 · Pages 285-290 · Computer Science

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Efficient management of student memberships, events, attendance, certificates, feedback, and analytics is essential for the effective functioning of academic committees. CAMPULSE is a web-based ERP platform developed for the Computer Science and Engineering student community to integrate membership administration and event lifecycle management into a unified digital system. The platform supports academic-year-wise membership processing, online payment integration, unique membership ID generation, automated receipt creation, and validity tracking, thereby streamlining the overall membership workflow and reducing administrative burden. For event management, CAMPULSE enables administrators to create, schedule, and manage events, define seat limits, control registration windows, and monitor real-time seat occupancy. The system also incorporates QR-based participation mechanisms to simplify attendance verification and ensure accurate participation records. Additionally, modules for automated attendance capture, certificate generation, feedback collection, and report generation significantly reduce manual effort while minimizing the risk of

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human errors. The system provides role-based dashboards for both students and administrators, offering actionable analytics and real-time insights into memberships, registrations, participation trends, and event outcomes. By centralizing data and automating routine administrative operations, CAMPULSE enhances transparency, strengthens operational control, and saves valuable time for committee members. Overall, CAMPULSE offers a scalable, reliable, and efficient digital solution for academic committee management by replacing fragmented manual processes with an integrated ERP framework. The proposed system improves organization, accuracy, accessibility, and decision-making while enabling smoother and more effective event execution. It further supports better coordination among committee members by maintaining a centralized record of activities and outcomes. The platform also promotes consistency in communication, reduces duplication of work, and improves responsiveness during event planning and execution. This makes CAMPULSE a practical and future-ready solution for modern student committee operations overall.

Keywords: Membership Management, Event Management, QR Attendance, Certificate Automation, Feedback System, Student ERP, Analytics Dashboard.

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60 The Impact of Corporate Social Responsibility Initiatives on Employees' Rights

Paper ID V12I2-1261 · Pages 291-294 · Law

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Since the inception of Corporate Social Responsibility (CSR), which dates back to the 18th century when it was merely seen as charity, it has progressed to becoming a key component of organizational governance. Its legal recognition under section 135 of the Companies Act, 2013, in India makes it even more critical in current times. Although historically, CSR referred to welfare initiatives for communities, its importance in the lives of internal stakeholders, especially employees, has increased in recent times. This essay aims to look at the ways CSR affects the rights of employees. Organizations practicing CSR are known to adopt ethical labor practices; improve workplace safety and health conditions, develop wellness programs and create equal opportunities. All these actions lead to creating an atmosphere of positivity, security, and inclusiveness. Moreover, these actions reflect the way the organizations align with national constitutions and international labor standards. Some ofthe areas in which organizations adopt CSR initiatives could include the provision of equitable remuneration, employee skills development, health insurance, and diversity and inclusion. Adopting such practices would help make employees happy, motivated, and protected. Practicing CSR promotes transparency in organizational dealings, thus enhancing employer-employee relationships. Moreover, a robust CSR culture may foster participative decision-making and ensure that grievance mechanisms exist while promoting dignity at work. On the other hand, surface-level CSR, which is driven by the need to present a good image to the public, is liable to detach the public perception from the reality of workers' rights in companies. The current paper proposes that the integration of CSR in corporate policies will have a direct positive impact on the rights of workers as an integral part of CSR rather than as a result of this activity. This approach will involve paying particular attention to the well-being of employees as a key element of the implementation of CSR. In light of the increasing importance of social justice, equity, and socially responsible activities on the international level, it is crucial to ensure employee rights in the context of corporate social responsibility.

Keywords: Corporate Social Responsibility (CSR), Employees’ Rights, Workplace Ethics, Labor Practices, Employee Well-Being.

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61 End to End Retail Demand Forecasting for Inventory Optimization using Machine Learning and MLOps

Paper ID V12I2-1164 · Pages 295-308 · Machine Learning

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Accurate demand forecasting is critical for modern retail supply chains to ensure optimal inventory management and reduce operational inefficiencies such as stockouts and overstocking. This paper presents an end-to-end cloud-native machine learning architecture for daily store-level retail demand forecasting. The proposed system integrates Amazon Web Services (AWS) components including Amazon S3 for scalable data storage, Amazon Athena for serverless analytics, SageMaker Feature Store for consistent feature management, XGBoost for predictive modeling, and SageMaker Model Monitor for production monitoring. The pipeline performs data ingestion, feature engineering, model training, batch prediction, real-time deployment, and automated monitoring. Experimental evaluation demonstrates the effectiveness of gradient boosting models combined with engineered time-series features for forecasting retail demand. The architecture highlights how cloud-based MLOps practices enable scalable and reliable forecasting systems in production environments.

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Keywords: Machine Learning, Retail Demand Forecasting, Time Series, MLOps.

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