3.3.1 Number of research papers published per teacher in the Journals notified on UGC website during the last five years

Year	2022-23	2021-22	2020-21	2019-20	2018-19	Total
Number of publications	54	29	11	18	8	**120**

3.3.1 Number of research papers published per teacher in the Journals notified on UGC website during the last five years

Sr. No.	Title of paper	Name of the author/s	Name of journal	Year of publication	ISSN number	Is it listed in UGC Care list/Scopus/Web of Science
1	Soil Fertility Detection and Crop Prediction using IoT and Machine Learning	Bhushan Chaudhari	International Journal of Membrane Science and Technology	2023	2410-1869	Yes
2	FCM with Spatial Constraint Multi-Kernel Distance-Based Segmentation and Optimized Deep Learning for Flood Detection	Bhushan Chaudhari	International Journal of Image and Graphics	2023	1793-6756	Yes
3	Thermal Radiation and Magnetic Fields Effects on Nanofluids flowing through Stretch Sheet	Chandu Koli	Journal of Computational Applied Mechanics	2023	2423-6713	Yes
4	Conversion of Hazardous Diesel Soot Particles into a Novel Highly Efficient 3D Hydrogel for Solar Desalination and Wastewater Purification	Shakeelur Raheman AR	American Chemical Society (ACS Omega)	2023	2470-1343	Yes
5	Descriptive Handwritten Paper Grading System using NLP and Fuzzy Logic	Bhushan Nandwalkar	International Journal of Performability Engineering	2023	0973-1318	Yes
6	A low-cost plant transpiration inspired 3D popsicle design for highly efficient solar desalination	Shakeelur Raheman AR	Desalination	2023	0011-9164	Yes
7	Workplace Communication: Efficacy and Challenges	Dr. Rajiv Junne	International Research Journal of Mangt. Sociology & Humanities	2023	2277-9809	Yes
8	Review of Composite Desiccants and their properties for Rotary Dehumidifiers	Bhushan C. Behede	European Chemical Bulletin	2023	2063-5346	Yes
9	Effect of nano materials for the nano fluids in solar thermal energy: A review on applications in solar collector	Dr. Nilesh Salunke	Materials Today: Proceedings	2023	2214-7853	Yes
10	Multi objective optimization of diesel engine performance and emission characteristics using taguchi-grey relational analysis	Dr. Nilesh Salunke	International Journal of Advanced Technology and Engineering Exploration	2023	2394-7454	Yes
11	Phase change materials (PCMs) in solar still: - a review of use to improve productivity of still	Dr. Nilesh Salunke	Materials Today: Proceedings	2023	2214-7853	Yes
12	Optimization and Modelling of EGR rate and MIS for POME fuelled CRDI diesel engine	Yogesh Sonawane	Case Studies in Thermal Engineering	2023	2214-157X	Yes
13	Thermal Analysis of vetical heated cylindrical	Dattatraya Doifode	Journal of Advance Zoology	2023	0253-7214	Yes
14	Nano-sized mesoporous biochar derived from biomass pyrolysis as electrochemical energy storage supercapacitor	Shakeelur Raheman Ar	Materials Science for Energy Technologies	2022	2589-2991	Yes

15	Improved electrosorption performance using acid treated electrode scaffold in capacitive deionization	Shakeelur Raheman Ar	Material Chemistry and Physics	2022	0254-0584	Yes
16	Ultra-High Energy Stored into Multi-Layered Functional Porous Carbon Tubes Enabled by High-Rate Intercalated Pseudocapacitance	Shakeelur Raheman Ar	Carbon Trends	2022	2667-0569	Yes
17	Norbornane Derived N-Doped Sp2 Carbon Framework as an Efficient Electrocatalyst for Oxygen Reduction Reaction and Hydrogen Evolution Reaction.	Shakeelur Raheman AR	Fuel (ELSEVIER-Science Direct)	2022	0016-2361	Yes
18	Current Progress in Thermochemical Conversion of Plastics into Jet-fuel Hydrocarbons and Recommendations for COVID-19 Waste Management.	Shakeelur Raheman AR	Process Safety and Environmental Protection (ELSEVIER-Science Direct)	2022	0957-5820	Yes
19	Room Temperature Sputtered Aluminum-Doped ZnO Thin Film Transparent Electrode for Application in Solar Cells and for Low-Band-Gap Optoelectronic Devices	Amol Badgujar	ACS Omega	2022	2470-1343	Yes
20	Role of Swarm Intelligence Algorithms on Secured Wireless Network Sensor Environment - A Comprehensive Review	Bhushan Chaudhari	International Journal of Performability Engineering	2022	0973-1318	Yes
21	Techno-economic assessment of manufacturing process in small scale industry to evaluate energy saving potential	Hitesh Thakare	Materials Today: Proceedings	2022	2214-7853	Yes
22	Application of mixed level design of Taguchi method to counter flow vortex tube	Hitesh Thakare	Materials Today: Proceedings	2022	2214-7853	Yes
23	Computation of Mass Spring Damper System Using Matlab	Gaurav Patil	JOURNAL OF EAST CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY	2022	1006-3080	Yes
24	Comparative Analysis of Artificial Intelligent Controllers Based Intentional Islanding Algorithm for Distributed Energy Resources (DERs) in Disaster Management	Ankush Kumar Mudholkar	Electric Power Components and Systems	2022	1532-5016	Yes
25	Student Attendance Tracker to Notify the Teacher and Parent Using Machine Learning	Makarand Shahade	Journal of Harbin Institute of Technology	2022	0367-6234	Yes
26	Analysis of Data Handling Challenges in Edge Computing	Khalid Alfatmi	International Journal of Performability Engineering	2022	0973-1318	Yes
27	Determining Soil Fertility with the help of Capacitive Touch Sensor	Ashish Awate	Compliance Engineering Journal	2022	0898-3577	Yes

28	Machine Learning Algorithms for Analysis and Prediction of Depression	Mayuri Kulkarni	SN Computer Science volume 3, Article number: 103 (2022)	2022	2661-8907	Yes
29	Tribological study of sunflower TMP ester and silica nanoparticles additives for hydrodynamic journal bearing application under boundary lubrication condition	Md Modassir Hussain	Journal of Industrial Lubrication and Tribology	2022	0036-8792	Yes
30	Automatic robot Manoeuvres detection using computer vision and deep learning techniques: a perspective of internet of robotics things (IoRT)	Makarand Shahade	Multimedia Tools and Applications	2022	1573-7721	Yes
31	Alzheimer disease classification using tawny flamingo based deep convolutional neural networks via federated learning	Umakant Mandawkar	The Imaging Science Journal	2022	1368-2199	Yes
32	Breast Cancer Pathological Image Classification Based on the Multiscale CNN Squeeze Model	Umakant Mandawkar	Computational Intelligence and Neuroscience	2022	1687-5265	Yes
33	Compendious Characterization Studies on the Physio Mechanical Behaviour of Habara Plant Fiber Fortified Epoxy Composites	Dr. Tushar Shinde	SAE International	2022	2688-3627	Yes
34	Overcoming IoT security challenges using Machine Learning	Ashish Awate	International Journal of Creative Research Thoughts	2022	2320-2882	Yes
35	Identification of IPC for Police Comlaint Using NLP	Bhushan Nandwalkar	International Journal of Creative Research Thoughts	2022	2320-2882	Yes
36	AI Chatbot for Plant and Animal Disease Detection Using Convolutional Neural Network	Makarand Shahade	International Journal of Creative Research Thoughts	2022	2320-2882	Yes
37	Detecting Cyberbullying Messages on Social Media	Bhushan Nandwalkar	International Journal of Creative Research Thoughts	2022	2320-2882	Yes
38	Solar absorption refrigeration systems use productive thermal storage PCMs: Review	Bhushan Patil, Dr. Nilesh Salunke, Dr. Vijay Diware	Pratibha: International journal of Science, Spirituality, Buisness & Technology (IJSSBT)	2022	2277-7261	Yes
39	Crime Detection Approach Using Big Data Analytics and Machine Learning	Vishal Moyal	NeuroQuantology	2022	1303-5150	Yes
40	Energy-Efficient UART Design on FPGA Using Dynamic Voltage Scaling for Green Communication in Industrial Sector	Vishal Moyal	Wireless Communications and Mobile Computing	2022	1530-8677	Yes
41	Innovations in Water Treatment Technology in Colder Climates	Deepak Singh Baghel	European Chemical Bulletin	2022	2063-5346	Yes
42	Development of Flood Hydrograph for Ungauged Catchment using SUH Approach – A Case Study of Patalganga River Basin	Deore Pratik	NeuroQuantology	2022	1303-5150	Yes

43	Indian Civil Engineering Consultancies' Prospects for Global Expansion: Opportunities and Challenges	Achal Agrawal	Neuro Quantology	2022	1303-5150	Yes
44	Sisal Fiber as an Economical and Ecologically Sound Material	Prerana Ikhar	Neuro Quantology	2022	1303-5150	Yes
45	Assessment of Fly Ash Concrete Strength using Ultrasonic Pulse Velocity and Rebound Hammer	Narayan Chandak	Neuro Quantology	2022	1303-5150	Yes
46	A Comprehensive Review of the Utilization of Copper Slag as a Partial Replacement for Sand in Cement Concrete: Environmental and Engineering Implications	Deepak Singh Baghel	Neuro Quantology	2022	1303-5150	Yes
47	Revolutionizing Structural Damage Identification and Health Monitoring in Civil Infrastructure with Deep Learning	Achal Agrawal	International Journal of Early Childhood Special Education	2022	1308-5581	Yes
48	Estimation of Non-Revenue water for irrigation systems: A compressive Review	Deore Pratik	Neuro Quantology	2022	1303-5150	Yes
49	Study of Allowable Bearing Capacity Using Standard Penetration Test	Yogesh Bafna	International Journal of Early Childhood Special Education	2022	1308-5581	Yes
50	Hydrodynamic Cavitation: Its optimization and potential application in treatment of Pigment Industry Wastewater	Shrikant Randhavane	Materials Today: Proceedings	2022	2214-7853	Yes
51	EXAMINING THE CURRENT WATER TREATMENT FACILITY AND PLANNING FOR INCREASED CAPACITY AT MIDC, WALUJ, CHHATRAPATI SAMBHAJINAGAR	Charudatta Thosar	European Chemical Bulletin	2022	2063-5346	Yes
52	Ground Water Contamination and Remediation: Assessing Risks and Solutions	Charudatta Thosar	Neuro Quantology	2022	1303-5150	Yes
53	Computer Vision in the Field of Electrical Engineering: A Review	Gaurav Patil	International Journal of Mechanical Engineering	2022	0974-5823	Yes
54	Analysis of Single Axis Solar Tracking System	Farha Naz	International Journal of Mechanical Engineering	2022	0974-5824	Yes
55	Renewable Energy Powered Sustainable Home	Namra Joshi	International Journal of Mechanical Engineering	2021	0974-5823	Yes
56	A Novel Fuzzy Logic Controller for Power Optimisation of Electric Vehicle Induction Motor	Mr. Jagdish More	International Journal of Mechanical Engineering	2021	0974-5823	Yes
57	A Critical and Comparative Review of Load Frequency Control Topologies and Control Techniques	Mr. Shahid Akhtar	International Journal of Mechanical Engineering	2021	0974-5823	Yes
58	Seismic Analysis of Reinforced Concrete Buildings in Hilly Topography	Narayan Chandak	Webology	2021	1735-188X	Yes

59	A Comprehensive Review on Performance Improvement of Diesel and Biodiesel fueled CI Engines using Additives	Dr. Nilesh Salunke	International Journal of Performability Engineering	2021	0973-1318	Yes
60	CdSe Quantum Dots/White Graphene Hexagonal Porous Boron Nitride Sheet (h-PBNs) Heterostructure Photocatalyst for Solar Driven H2 Production.	Shakeelur Raheman AR	Journal of Material Chemistry C (RSC)	2021	2799-1245	Yes
61	Solution-processed CIGS thin film solar cell by controlled selenization process	Amol Badgujar	Materials Today Proceedings	2021	2214-7853	Yes
62	Review on nanoporous inorganic desiccant materials in the context of application in rotary dehumidifiers	Bhushan Behede	Materials Today Proceedings	2021	2214-7853	Yes
63	Role Of Renewable Energy Development In Economic Growth: Indian Perspective	Namra Joshi	Turkish Online Journal of Qualitative Inquiry (TOJQI)	2021	1309-6591	Yes
64	Photo-enhanced field-emission behavior of CdSSe microflowers	Sachin Nerkar	International Journal of Modern Physics B	2021	1793-6578	Yes
65	Social distancing using IoT approach	Mayuri Kulkarni	Journal of Electrical Systems and Information Technology	2021	2314-7172	Yes
66	Drought identification and analysis of precipitation trends in Beed District, Maharashtra	Satish Taji	Materials Today Proceedings	2021	2214-7853	Yes
67	Cycles for air conditioning systems operated using Rotary Desiccant wheels	Bhushan C. Behede	International Journal of Multidisciplinary educational Research	2021	2277-7881	Yes
68	Design and Analysis of Solar Water Purification System	Mohammad Juneduddin	International Research Journal of Engineering and Technology (IRJET)	2021	2395-0056	Yes
69	A review: Studies on different performance improvement methods for Battery thermal management systems for Li-ion battery	Satish Patil	International Journal of Creative Research Thoughts (IJCRT)	2021	2320-2882	Yes
70	Performance Analysis of Particle Swarm Optimization and Dynamic Source Routing for Packet Route Optimization in Mobile Ad-Hoc Networks	Bhushan Chaudhari	International Journal of Creative Research Thoughts (IJCRT)	2021	2320-2882	Yes
71	Analysis of Vehicle Chassis Frame made of different Composite Materials	Dhiraj K. Bhandarkar	International Journal of Creative Research Thoughts (IJCRT)	2021	2320-2882	Yes
72	The Rocker Bogie Mechanism: Design and Fabrication	Dhiraj K. Bhandarkar	International Journal of Innovations in Engineering and Science (IJIES)	2021	2456-3463	Yes
73	A Novel CNN Method for the Accurate Spatial Data Recovery from Digital Images	Vishal Moyal	Materials Today: Proceedings	2021	2214-7853	Yes
74	An Efficient Shape Adaptive Techniques for the Digital Image Denoising	Vishal Moyal	Turkish Journal of Computer and Mathematics Education	2021	1309-4653	Yes

75	Enhance the ability to diagnose, monitor and treat medical issues through image processing	Vishal Moyal	Bulletin of Environment, Pharmacology and Life Sciences	2021	2277-1808	Yes
76	Implementing a Programmable Drop Voltage Controller VLSI	Vishal Moyal	Journal of Nuclear Energy Science & Power Generation Technology	2021	2325-9809	Yes
77	Perovskite Solar Cells & methods for improving Efficiency, Stability and Durability	Sandeep Ushkewar	The Indian Journal of Technical Education	2021	0971-3034	Yes
78	An Improved Approach for Pedestrian Safety in Road Development and Land Use Planning	Basweshwar S. Jirwankar	NeuroQuantology	2021	1303-5150	Yes
79	In India's Urban Planning: Uncovering Challenges and Solutions for Indian Cities	Basweshwar S. Jirwankar	Neuro Quantology	2021	1303-5150	Yes
80	Constructing a physical model using Mivan technology including the evaluation and estimation of building	Darshankumar Patel	Neuro Quantology	2021	1303-5150	Yes
81	Study of Existing Water Treatment Plant and Expansion for Future Growth at MIDC, Avdhan, Dhule	Shrikant Randhavane	European Chemical Bulletin	2021	2063-5346	Yes
82	Green Building: A Holistic Overview of Cost Effective Housing	Prerana Ikhar	Neuro Quantology	2021	1303-5150	Yes
83	An overview of Bearing Capacity of Foundation	Yogesh Bafna	International Journal of Early Childhood Special Education	2021	1308-5581	Yes
84	Optimization of Axial Flow Compressor Blades Using Genetic Algorithm and Computational Fluid Dynamics	Dr. Nilesh Salunke	International Journal of Mechanical and Production Engineering Research and Development (IJMPERD)	2020	2249–8001	Yes
85	Optimization of High Pressure Ratio Compressor Blade Section	Dr. Nilesh Salunke	International Journal of Mechanical and Production Engineering Research and Development (IJMPERD)	2020	2249–8001	Yes
86	Aerodynamic Design and Analysis of A Transonic Axial Flow Compressor Stage	Dr. Nilesh Salunke	International Journal of Mechanical and Production Engineering Research and Development (IJMPERD)	2020	2249–8001	Yes
87	Developing Public Transport Accessibility Model for Nashik city, Maharashtra, India	Darshankumar Patel	IJSTR-Internation Journal of Scientific & Technology Research	2020	2277-8616	Yes
88	Cultivation and potential application of microalgae in treatment of Pesticide Manufacturing Effluent	Shrikant Randhavane	Materials Today: Proceedings	2020	2214-7853	Yes
89	Low Temperature Combustion with Multiple Injection Strategies in Single Cylinder Diesel Engine	Yogesh Sonawane	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	2020	2278-3075	Yes

90	Investigation of an Open Graded Asphalt Concrete Overlay for the Mitigation of Reflection Cracking Phenomenon	Yogesh Bafna	Turkish Journal of Computer and Mathematics Education	2020	2351-2358	Yes
91	Review of Compaction Energies, Fiber Reinforcement, and the Function of Human Hair in Improving Pervious Concrete Properties	Prerana Ikhar	Turkish Journal of Computer and Mathematics Education	2020	2351-2358	Yes
92	Impact of COVID-19 on the Construction and Engineering Industry	Darshankumar Patel	Turkish Journal of Computer and Mathematics Education	2020	2351-2358	Yes
93	Advancing Groundwater Recharge: Harnessing Man-Made Conveyances for Sustainable Aquifer Enhancement	Basweshwar S. Jirwankar	Turkish Journal of Computer and Mathematics Education	2020	2351-2358	Yes
94	Digital and Online Education System in India	Darshankumar Patel	international journal of research	2020	2231- 6124	Yes
95	Heat Transfer Coefficient Enhancement In Natural Convection From Horizontal Rectangular Fin Arrays With Perforations	Dr. Nilesh Salunke	International Journal of Mechanical Engineering and Technology (IJMET)	2019	0976-6359	Yes
96	A novel approach for intrusion detection in mobile ad hoc networks	Bhushan Chaudhari	International Journal of Networking & Virtual organizations	2019	1741-5225	Yes
97	Generation, Distribution & Utilization of an Electric energy in Industrial & domestic Buildings	Bhushan C. Behede	IJEAT- International Journal of Engineering and Advanced Technology	2019	2249-8958	Yes
98	Comparing Geometric Parameters of a Hydrodynamic Cavitation Process treating Pesticide effluent	Shrikant Randhavane	Environmental Engineering Research Journal	2019	1226-1025	Yes
99	A Suggestive Low Power TIQ Comparator Architecture using Adiabatic Logic for Implementation of 3-bit Flash type ADC.	Vishal Moyal	International Journal of Engineering and Advanced Technology (IJEAT)	2019	2249-8958	Yes
100	Thermo electric air conditioning as alternative to conventional air conditioning system	Satish R. Patil	Journal of Emerging Technologies & Innovative Research (JETIR)	2019	2349-5162	Yes
101	POWER GENERATION USING PERMANENT MAGNETIC GENERATOR TROUGH BRAKING SYSTEM FOR TWO WHEELER	Dhiraj K. Bhandarkar	Journal of Emerging Technologies & Innovative Research (JETIR)	2019	2349-5162	Yes
102	The Influence of Urbanization on the Sustainability of Dhule City	Basweshwar S. Jirwankar	Internation Journal of Research and Analytical Reviews	2019	2348-1269	Yes
103	Scenario of Water supply and demand for Cauvery Basin: PODIUM Sim Approach	Shrikant Randhavane	Internation Journal of Research and Analytical Reviews	2019	2348-1269	Yes
104	Taguchi Analysis of Pervious Concrete Mixtures: A Way to Increase Strength and Permeability	Prerana Ikhar	Turkish Journal of Computer and Mathematics Education	2019	2351-2358	Yes
105	Analysing Structural Behaviour under Dynamic Loading with Soil-Structure Interaction	Yogesh Bafna	Turkish Journal of Computer and Mathematics Education	2019	2351-2358	Yes

106	Navigating Dhule's Future: A BRTS Estimation Survey for Urban Mobility	Basweshwar S. Jirwankar	Turkish Journal of Computer and Mathematics Education	2019	2351-2358	Yes
107	Design and Fabrication of Automatic Sewage Cleaner	Mohammed Juneduddin	Internation Journal of Innovative Research in Technology (IJIRT)	2019	2349-6002	Yes
108	Design of Phase Change Material Based Insulation for Building	Mohammed Juneduddin	Internation Journal of Innovative Research in Technology (IJIRT)	2019	2349-6002	Yes
109	Analysis and implementation of FACTS devices on a transmission line	Sandeep Ushkewar	Journal of critical reviews (JCR)	2019	2394-5125	Yes
110	A Comprehensive Review of Haptic Technology and its Applications	Gaurav Patil	Journal of critical reviews (JCR)	2019	2394-5125	Yes
111	A Brief Review of Charging Station Topologies for Electric Vehicles	Mr. Jagdish More	Journal of critical reviews (JCR)	2019	2394-5125	Yes
112	A review of IoT in Agriculture: opportunities, challenges, and benefits for farmers	Ms. Farha Naz	Journal of critical reviews (JCR)	2019	2394-5125	Yes
113	Hilly Highways Accident Alert System	Namra Joshi	Journal of Emerging Technologies and Innovative Research	2018	2349-5162	Yes
114	A Hybrid Solar -Wind Power Generation System : Challenges and Prospects	Sandeep Ushkewar	Journal of Emerging Technologies and Innovative Research	2018	2349-5162	Yes
115	A Hybrid Solar -Wind Power Generation System : Challenges and Prospects	Jagdish More	Journal of Emerging Technologies and Innovative Research	2018	2349-5162	Yes
116	Rechargeable Li-Ion Based Electrical Vehicle	Gaurav Patil	Journal of Emerging Technologies and Innovative Research	2018	2349-5162	Yes
117	Design Analysis And Optimization Of Crane Platform Base On Composite Structural Sandwich Plate	Dr. Nilesh Salunke	International Journal of Mechanical Engineering and Technology (IJMET)	2018	0976-6359	Yes
118	Planning and Development of a Green Highway in India with a Focus on Sustainability	Darshankumar Patel	Internation Journal of Research and Analytical Reviews	2018	2348-1269	Yes
119	Development of Smart Bot Application	Mohammed Juneduddin	Journal of Emerging Technologies & Innovative Research (JETIR)	2018	2349-5162	Yes
120	Development of a Language Translation & Language Understanding Model UsingMachine Learning	Mohammed Juneduddin	Journal of Emerging Technologies & Innovative Research (JETIR)	2018	2349-5162	Yes

Soil Fertility Detection and Crop Prediction using IoT and Machine Learning

Bhushan Chaudhari[1*], Sachin Kamble[2], Madhuri Patil[3], Gayatri Bhosale[4], Kavita Jagtap[5], Gaurav Patil[6], Priyanka Wakalkar[7]

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Abstract: India has huge agriculture heritage. This is the major source of livelihood for most Indian families. Farmers are seen to use fertilizers in inappropriate proportion to enhance crop yield which results in infertile land. To overcome this issue, to check the fertility level of the soil, environment conditions and predicting suitable crop and fertilizers required is need of hour. Soil fertility depends on nutrients like Nitrogen (N), Phosphorous (P), and Potassium (K). It is also affected by environmental factors such as temperature, moisture, humidity, etc. The proposed system provides a cost-effective solution using IoT and Machine Learning based approach to check the NPK concentration present in the soil. Based on which, user can predict the soil suitable crop. The technique used comprises an integrated light transmission and detection system which consists of three LEDs with different wavelengths. Photodiode (LDR sensor module) is used for light detection purposes. The output obtained from the photodiode is handled using a Arduino UNO microcontroller. Based on the inputs received from LDR module, NPK concentration can be evaluated. The model is trained with the Crop Prediction dataset to predict the crop using LightGBM algorithm. The proportion of NPK nutrients and the predicted crop is sent to the user as a text message through the GSM module and ThingSpeak cloud platform.

Keywords: NPK, Micro-controller, IoT, Machine Learning, LightGBM, LED, ThingSpeak cloud platform, Photodiode.

1. INTRODUCTION

The growth of a country's overall economy is largely dependent on the agricultural sector. The population of India increases day by day. India is the second-highest populated country in the world. 70% of rural Indian households get their income mostly from agriculture. In India, 82% of farmers are marginal and small. The total amount of food grains produced in India in 2017–2018 was 275 million tons. [1, 2].

Nowadays crop failures are one of the reasons behind farmers' suicides. [3] Therefore it is necessary to check the soil fertility before taking the crop in the soil. For optimal growth of the crop, land should have adequate fertilizers for good yields and food production. Plants extract nutrients from the soil which are required for their growth. These nutrients are classified into two types:

i. Micronutrients: These nutrients are taken up in large amounts. It includes Chlorine (Cl), Boron (B), Copper (Cu), Iron (Fe), Molybdenum (Mo), Nickel (Ni) and Zinc (Zn).

ii. Macronutrients: These nutrients are taken up in small amounts. It includes Nitrogen (N), Magnesium (Mg), Sulphur (S), Potassium (K), Phosphorus (P) [4].

Out of the macronutrients which are present in the soil, Potassium, Nitrogen and Phosphorous are important nutrients for the growth of plants. While Potassium stimulates flowering and fruiting as well as maintaining nutritional and water balance in a plant cell, Phosphorus stimulates root growth and Nitrogen encourages the growth of leaves and other vegetation [5, 6]. Poor plant production is caused by insufficient fertilizer use, whereas contaminated soil is caused by excessive fertilizer use [7]. Therefore, for good plant growth, these components are crucial and must be present in the soil in the proper quantity.

The majority of farmers spray fertilizer into the soil directly due to a lack of infrastructure. Because of financial limitations and the unavailability of a nearby soil testing facility, farmers cannot regularly measure the nutrient content of the soil. Furthermore, it takes a long time for farmers to get the findings of soil tests. There is need of a method that is both efficient and portable to measure the nutrient levels in soil, as it is important to have a convenient method to accurately measure the soil nutrient levels in various locations [5, 6].

Rajesh S Prasad, Jayashree Rajesh Prasad, Bhushan S. Chaudhari, Nihar M Ranjan, and Rajat Srivastava

‹ Previous   Next ›

Abstract

Floods are the deadly and catastrophic disasters, causing loss of life and harm to assets, farmland, and infrastructure. To address this, it is necessary to devise and employ an effective flood management system that can immediately identify flood areas to initiate relief measures as soon as possible. Therefore, this research work develops an effective flood detection method, named Anti- Corona-Shuffled Shepherd Optimization Algorithm-based Deep Quantum Neural Network (ACSSOA-based Deep QNN) for identifying the flooded areas. Here, the segmentation process is performed using Fuzzy C-Means with Spatial Constraint Multi-Kernel Distance (MKFCM_S) wherein the Fuzzy C-Means (FCM) is modified with Spatial Constraints Based on Kernel-Induced Distance (KFCM_S). For flood detection, Deep QNN has been used wherein the training progression of Deep QNN is done using designed optimization algorithm, called ACSSOA. Besides, the designed ACSSOA is newly formed by the hybridization of Anti Corona Virus Optimization (ACVO) and Shuffled Shepherd Optimization Algorithm (SSOA). The devised method was evaluated using the Kerala Floods database, and it acquires the segmentation accuracy, testing accuracy, sensitivity, and specificity with highest values of 0.904, 0.914, 0.927, and 0.920, respectively.

Keywords: Satellite imagery ▪ flood detection ▪ anti-corona virus optimization ▪ shuffled shepherd optimization algorithm ▪ deep learning

We recommend

Thermal Radiation and Magnetic Fields Effects on Nanofluids flowing through Stretch Sheet

Authors

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Abstract

The purpose of the present study is to observe when suction/injection is present, effects of thermophoresis and Brownian motion, emphasises the combined influence of convective heat radiation and the magnetic field nanofluid flow in the direction of a permeable stretched sheet. The Rosseland approximation is used to explain the radiative heat flux in the heat convective analysis. Hypersonic flight, power plants and vehicles, gas turbines and reactors of nuclear power, and the modelling of relevant equipment, among other applications, applicable from radiative heat transfer. The boundary wall is designed into account for stretching and suction/injection circumstances. In order to simplify the dimensionless version of fundamental governing equations, the governing nonlinear partial differential equations (PDEs) are changed to ordinary differential equations (ODEs) by using transformations of similarity.In the final numerical result version of fundamental equations is simplified through the use of the numerical approach of the shooting technique by the Runge-Kutta method and a shooting scheme. Graphical data demonstrations are in order to study the effect on dissimilar physical constraints, such as velocity, temperature, and concentration of surrounding environment the numerical data is also used to look into changing trends in rates of coefficient of skin friction, mass and heat transfer. Additionally in which proposed model is validated is by making comparisons to an isolated instance of a previously researched issue.

Conversion of Hazardous Diesel Soot Particles into a Novel Highly Efficient 3D Hydrogel for Solar Desalination and Wastewater Purification

Higgins M. Wilson, Shakeelur Raheman A. R, Hyeong Woo Lim, and Sang Joon Lee*

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ABSTRACT: Diesel particulate matter (DPM) generated as vehicular exhaust is one of the main sources of atmospheric soot. These soot particles have been known to cause adverse health problems in humans and cause acute environmental problems. Despite great efforts for minimizing soot production, research on the disposal and recycling of inevitable diesel soot is scarce. However, DPM consists mainly of carbonaceous soot (DS) that can be easily utilized as a photothermal material for solar desalination. Recently, interfacial solar steam generation using three-dimensional (3D) structures has gained extensive attention. 3D-structured hydrogels have exhibited incredible performance in solar desalination owing to their tunable physicochemical properties, hydrophilicity, intrinsic heat localization, and excellent water transport capability. Herein, a novel DS-incorporated 3D polyvinyl alcohol (PVA)-based hydrogel is proposed for highly efficient solar desalination. The polymer network incorporated with purified DS (DS_H) achieved an excellent evaporation rate of 3.01 kg m^{-2} h^{-1} under 1 sun illumination due to its vertically aligned water channels, hydrophilicity, and intrinsic porous structure. In addition, the DS_H-PVA hydrogel could generate desalinated water efficiently (2.5 kg m^{-2} h^{-1}) with anti-salt fouling properties. The present results would motivate the utilization and recycling of waste materials like DS as photothermal materials for efficient, low-cost, and sustainable solar desalination.
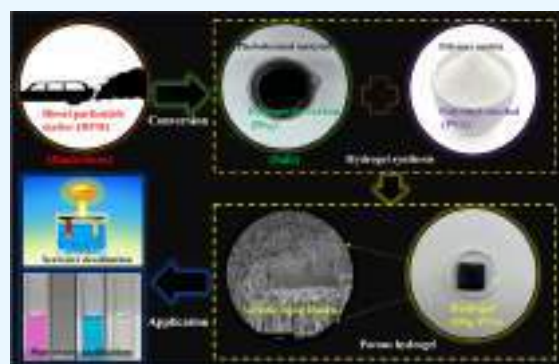
1. INTRODUCTION

Fresh water scarcity has become one of the major global issues seeking urgent and sustainable solutions owing to the rapidly increasing demand for fresh water with population explosion, industrialization, and contamination of limited natural resources.[1,2] Despite extensive studies on sustainable water purification technologies, there is still a great demand for innovative and green water purification techniques due to the requirement of external energy supply and large-scale infrastructure in conventional water purification technologies.[3] Solar-driven desalination has recently gained large attention in this regard with the recent introduction of interfacial solar−thermal steam generation (ISSG) technique which focuses on the evaporation of water molecules at the air−water interface rather than the boiling of bulk water solution.[4−6] ISSG-based desalination has emerged as a promising sustainable and green solution to fresh water shortage problem owing to its superior photothermal efficiency, facile infrastructure, and cost effectiveness.[7] However, this technique is in its nascent stage of development and requires further detailed studies on efficient photothermal materials, micro-/nanostructures, and configuration designs for its applicability in large-scale systems.[8]

Numerous solar steam generators with extremely high evaporation rates and near 100% SSG efficiencies have been introduced recently.[9] In each case, the photothermal materials play a crucial role with its high solar absorption capability of >95% in solar spectra and convert the incoming solar energy into heat at the air−water interface.[10,11] For example, metallic nanoparticles like Au, carbon-based materials like graphene, semiconductor materials like MoS_2 and polymeric materials such as polypyrrole have been utilized extensively.[9,11,12] Among them, carbon-based materials have gained large attention owing to their black body features like light absorption, low-cost, and facile fabrication procedure.[13] However, few reports focused on the use of waste materials like soot as photothermal materials.[4,14,15] In addition, reports on the utilization of diesel soot (DS) particles extracted from heavy vehicles for ISSG are negligible. In our previous report, we discussed an innovative idea of the usage of hydrophobic

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Descriptive Handwritten Paper Grading System using NLP and Fuzzy Logic

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PDF

7

Abstract

Abstract: The rapid changes in the educational sector driven by the daily growth in technology breakthroughs have produced a very effective learning environment. Assessment is crucial to ascertain how well students learn and the amount of relevant knowledge and skills they have mastered. Current systems have limitations concerning volume, manpower, and variety in assessment methodologies. A physical paper evaluation is very repetitive, difficult, and complex and entails numerous logistical operations. Such a handwritten paper grading technique steadily increases the length of time needed to examine the answers and does not guarantee correctness in scoring the answers. Online evaluation cannot guarantee the correctness of the solutions supplied by other test takers. The solution is to make the examiner's job easier while reviewing papers and judging how creatively pupils responded to the questions. This inspired the development of an online automatic grading system that grades students' handwritten papers. Natural Language Processing methods like TF-IDF and BERT can be used to determine the count of important keyword frequencies in students' responses, and how closely the text matches the original answer. An inference system that uses fuzzy logic can later be used to grade the responses. Therefore, this paper proposes an online grading system that combines NLP and Fuzzy Logic to score and evaluate fellow students' handwritten papers.

Key words: NLP, Fuzzy Logic, TF-IDF, BERT, Handwritten OCR Recognition

References

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A low-cost plant transpiration inspired 3D popsicle design for highly efficient solar desalination

Higgins M. Wilson [a], Younghoon Suh [a], Hyeong Woo Lim [a], Shakeelur Raheman A.R. [b], Sang Joon Lee [a]

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Abstract

Solar-powered desalination is an attractive solution to the problem of water scarcity, but the practical applications of three-dimensional (3D) interfacial solar steam generators have been limited by their complex production methods, low water generation rates, and durability issues. This study proposes a low-cost, easy-to-produce 3D solar steam generator with a popsicle design that employs diesel soot coated on polyvinyl alcohol sponges and plant transpiration-inspired chopsticks wrapped in airlaid paper for efficient water transport. The effects of various design factors are investigated, and it is found that the DSp-PVA-3D-6 configuration achieved an impressive evaporation rate of $3.81 \, \mathrm{kg \, m^{-2} \, h^{-1}}$ under one sun illumination. The generator also demonstrated anti-salt fouling ability and sustained high evaporation performance over an extended period. Indoor seawater desalination studies yielded positive outcomes, while outdoor experiments showed that the DSp-PVA-3D array efficiently produced fresh water ($2 \, \mathrm{L \, m^{-2} \, h^{-1}}$) meeting daily human fresh water requirements. This proposed design is a significant step towards creating practical, inexpensive steam generators for real-world solar-powered saltwater desalination, offering a promising solution to global water scarcity.

Introduction

Recently, the availability of fresh water has become a global concern primarily driven by rapid growth in population [1,2]. Conventional water purification technologies such as reverse osmosis (RO) require complex infrastructure, large capital investment and constant supply of high-grade energy which make them impractical in viewpoints of sustainable and ecofriendly applications [3]. In this regard, interfacial solar steam generation (ISSG) based water purification has gained large traction as a promising alternative solution mainly due to its excellent light to heat conversion efficiencies and low-cost infrastructure [[4], [5], [6]]. In addition, the current ISSG generators can achieve zero liquid discharge making them highly favorable over RO based technologies whose brine production needs proper follow up measures [7].

Recent technological advancements in the design aspects of ISSG based photothermal generators have led to significant improvement in SSG performance. The major change is the introduction of 3-dimensional (3D) structures with increased effective surface area [[8], [9], [10]]. The 3D structures have has achieved dramatic increase in evaporation rates, breaking the theoretical limits of ISSG efficiencies. This is attributed to the increase in side surface area with increased height and the role of ambient heating from surrounding environment in 3D ISSG generators [11]. In this

Workplace-communication: Efficacy and Challenges

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Abstract: Effective communication has been referred to as the lifeblood of every organisation since it is essential to launching, growing, and maintaining the organization's entrepreneurial effort. The flow of information in the organization decides the amicable relationships among its employees. Furthermore, the nature of the organization can easily be predicted based on the direction of the flow of information. In this setting, workplace communication is crucial to the efficient operation of the business. Any organization's communication can easily reveal how effectively it operates. The quality of the information flow affects employee behaviour within a business as well. Also, the connection between the organisation and its surroundings can readily tarnish or improve the market image of the organisation. The nurturing environment that is established with the open flow of information through pleasant communication also plays a significant role in work contentment. Workplace interpersonal relationships can be friendly with good communication. Effective communication also sprouts and nurtures teamwork, team building, and motivational skills. With appropriate attention to workplace communication, its efficacy, and its problems, this study aims to analyze the communication process.

Keywords: Efficacy, Workplace-communication, Behaviour, Organization, Challenges.

Introduction: Workplace communication refers to the verbal and nonverbal exchange of ideas and information between individuals or groups inside or outside of an organisation. The process of transferring information, concepts, and messages among staff members, managers, and other organisation stakeholders is known as workplace communication. Each firm that wants to succeed must have effective workplace communication because it boosts morale, fosters strong relationships, and increases productivity. In every organization, communication should be clear, concise, and to the point. Employees should be able to understand what is being said without any confusion. Communication should be timely and delivered in a well- manner. Information should be communicated when it is needed and employees should be kept up-to-date on any changes or updates. Communication should be relevant to the task or issue at hand. It should not be vague or unrelated to the situation. The tone is an important aspect of communication. The tone should be

REVIEW OF COMPOSITE DESICCANTS AND THEIR PROPERTIES FOR ROTARY DEHUMIDIFIERS

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Abstract: Background: The rotary dehumidifier's performance largely depends on the desiccant used in the wheel. Composite desiccants are the state-of-the-art sorption agents used in adsorption dehumidifiers as they have higher moisture uptake capacity than pure physical desiccants. Different types of composite desiccants used in rotary dehumidifiers are mainly of four kinds Silica-gel based, Mesoporous silicate-based, natural-rock based, and carbon-based. A review of work done in the past with these desiccants has been reviewed in this paper. The selection of composite desiccant material for dehumidifiers depends not solely on any one parameter but various. Surface properties like specific surface area, pore volume, and the desiccant's pore size have also been proved as vital parameters in the performance of the dehumidifiers and the higher adsorption capacity. Surface properties and operating parameters like the temperature of adsorption and desorption for different composite desiccants were summarized in this paper which will help the new researchers to analyse other composite desiccants. Composite desiccants regenerated well below 100 °C will gain more attention from researchers in the coming years as solar energy prevails compared to conventional heat sources.

Keywords: Composite desiccants, Rotary dehumidifiers, Adsorption, Regeneration, Silica-gel

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INTRODUCTION

In recent years, electrical power consumption has skyrocketed because of modern society's growing industrial needs and comfort requirements. Conventional power plants are dominant players in the energy sector, dependent on fossil fuel sources for power generation. Meanwhile, fossil fuel scarcity and the risk of global warming have pushed the air conditioning sector to identify innovative cooling or dehumidification technologies to support or perhaps replace traditional vapor compression systems. As a result, different potential dehumidification technologies, like

Effect of nano materials for the nano fluids in solar thermal energy: A review on applications in solar collector

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ARTICLE INFO

ABSTRACT

Sun is the prime source of energy in the universe. Solar energy is available freely and has no adverse effect on the environment like greenhouse gases, CO_2 emission etc. Hence, solar energy has the significant role amongst all renewable energy sources. The conversion of solar energy into the thermal energy can be done through the flat plate solar collector. The conventional working fluids used in the solar collector has poor thermo-physical properties which lowers the efficiency of solar collector. This review throws light on the latest developments on the performance improvement of solar flat plate collector. The earlier research performed on the use of nanofluids for the performance improvement of solar flat plate collector is comprehensively presented. An extensive research indicates that improving the thermo-physical properties of conventional heat transfer fluid leads to the performance improvement of flat plate solar collector. This can be achieved by the use of nanofluid instead of conventional fluid in solar collector.
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1. Introduction

The population of the world is increasing at a very fast rate. The energy requirement of this increasing population is also very high. Presently, the global energy production depends on fossil fuels which leads to add up the carbon content in the globe and global warming. GE assessment [1] shows that the utilization of fossil fuel is increasing per year by 2 %. Hence, the sources of fossil fuels are depleting rapidly. It is a high time now to shift energy dependence on the renewable energy sources. Zayed et al. [2] concluded that the solar energy is most auspicious source among all of the renewable energy sources because of its availability throughout the year. Bazri et al. [3] indicated the use of solar energy leads to carbon free eco-system and clean environment and it is less costly. Kabeel et al. [4] and Nikolic and Lukic [5] shows that flat plate solar collectors are the simplest device used for the conversion of solar energy into heat energy. Kong et al. [6] used flat plate solar collectors for the purpose of water heating for both domestic and industrial applications. Li et al. [7] had identified the major disadvantage associated with the simple flat plate solar collector are its less thermal efficiency and minimum to low convective heat transfer coefficient between the absorber plate and conventional heat transfer fluid. They noticed that the reason of less efficiency of solar collector is poor heat transfer characteristics of heat transfer fluid. Choi and Eastman [8] came up with the solution to this problem. They replaces the conventional fluid in flat plate solar collector by the nanofluids. Nanofluid is the mixture of base fluid and nanoparticles with size less than 100 nm. Gupta et al. [9] concuded that the nanofluids have better thermo-physical properties in comparison with the conventional fluid and hence nanofluid exhibit better heat transfer characteristics. The research shows that there is enhancement in the thermal conductivity when nanoparticles are mixed with the base fluid. Consequently, the nanofluids are gaining the interest of researchers. Several nanoparticles can be used to prepare the nanofluids like metallic nanoparticles, metal oxides nanoparticles etc. Table 1 illustrates the thermal conductivity of different metallic and metal oxide nanoparticles.

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Research Article

Multi objective optimization of diesel engine performance and emission characteristics using taguchi-grey relational analysis

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Abstract
A promising solution to the problem of fuel depletion and energy security is the use of biodiesel as an alternative fuel for diesel engines. It is used in blended or pure forms without any engine modification. The aim of this study is to reduce smoke and nitrogen oxide (NOx) emissions while maintaining brake thermal efficiency (BTE) and brake specific fuel consumption (BSFC) in a biodiesel-fuelled variable compression ratio (VCR) diesel engine. Experiments were conducted using a Taguchi design based L9 orthogonal array. The effects of three control parameters were investigated: engine load, blend ratio, and compression ratio (CR). The signal-to-noise (S/N) ratio of Taguchi was calculated based on their performance characteristics. Using a response table and a response graph, the optimal level of control factors was determined based on this grade. An analysis of variance (ANOVA) is used to estimate the individual effects of components. The results of the trials show that 75% engine load, 20% blend ratio, and a CR of 18 are the best combinations for reducing smoke and NOx. When compared to diesel this combination results in a 32.3% reduction in smoke, a 19.7% reduction in NOx emissions, a marginal decrease of 2.17% in BTE, and a 5.9% decrease in BSFC. It is evident that Taguchi design combined with grey relational analysis (GRA) can efficiently predict response values using an optimal combination of control factors.

Keywords
Diesel engine, Biodiesel, Emission, Taguchi design, GRA, ANOVA.

1.Introduction
The end of the pandemic has caused a surge in primary energy consumption in China and India, with diesel being the most common [1]. Diesel is known for its superior thermal efficiency, lean burning ability, and long durability, but crude oil reserves are expected to be limited and non-renewable. There have been serious concerns over oil price fluctuations and the environmental impact of emissions generated by its use [2]. In the specific context of India, imports of crude oil, coal, and natural gas have an adverse impact on forex reserves. Various efforts are being made to reduce the use of crude oil in engines, such as using vegetable oils, biofuels, and biodiesel. The National Bioenergy Mission was introduced to provide a regulatory environment for high capital investment in biomass-based power plants [3].

In 2017, bioenergy was the third largest contributor, accounting for 21% of the primary energy supply in India [4]. The National Biofuels Mission was implemented in 2018 with the aim of 20% fuel blending for biodiesel and bioethanol, respectively [5]. The "Biofuels for Atmanirbhar Bharat" policy was implemented to promote non-food feedstocks and biodiesel blending in transportation, stationary uses, and portable uses [6]. However, biodiesel production in India is still in its early stages, with up to 5% blends marketed in 3400 locations [7].

Biodiesel fuel needs to overcome a few challenges to gain wider acceptance among end users. An existing diesel engine can be used to blend up to 20% biodiesel with conventional diesel without any significant engine modifications, which lowers associated technical costs [8]. Research has investigated the performance and emission behaviour of diesel engines fuelled with biodiesel blends,

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Phase change materials (PCMs) in solar still: - a review of use to improve productivity of still

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ARTICLE INFO

ABSTRACT

This study examines the utilization of phase change materials as latent heat storage devices to boost the output of solar stills. These results show that compared to a solar still without phase change material, a passive solar still equipped with phase change material can boost its yield up to 120%. An active solar system equipped with phase change material can enhance productivity by as much as 700%. These findings show that productivity rises with PCM mass and declines with salty water bulk. Additionally, it is discovered that the PCM performs worse during the day than at night. The most often used PCMs in productivity improvement studies were likewise found to be organic PCMs (like paraffin), with inorganic and eutectic PCMs garnering very little attention. From the present study it is clear that most of researchers used paraffin as a PCM. Also mixing of nano particles (such as silicon oil and Cu nano particles) in the PCM gives better result. Paraffin wax with nAl_2O_3 enhanced the production by 60.53%.

1. Introduction

Renewable energy sources are getting more attention as a result of environmental issues and the depletion of fossil fuel resources. Solar energy has received significant promotion as a trustworthy source of energy in recent years. The process of turning solar radiation into heat is one of the most basic and straightforward uses of this energy. Solar radiation can be used as a backup energy source for central heating systems as well as to heat water in swimming pools and hot water systems. In this example, a solar panel is used to convert solar radiation's energy into heat. Using the sun's energy to warm water is not a novel idea. Water tanks with black paint that date back more than a century [1–12].

Water is an inevitable part of life and is essential for the survival and advancement of human civilization. The main users of water are bio-residents, which includes humans. 71% of the earth's strata are covered by water, either in the form of icebergs or the ocean. The earth's layers also contain 97.5 percent saline water and only 2.5 percent fresh water in the form of surface or ground water.

Members of the bio-network, including people, have access to less than 1% of fresh water. [13].

Water is necessary for both industrial development and agriculture. The supply and demand of fresh water have become unbalanced due to a rise in world population and increased tree destruction for the advancement of civilization [14]. Because of this, finding drinkable water is becoming a bigger problem in many places of the world. It is vital to look into the other side of drinkable water production in order to solve the issue of acquiring drinkable water [15].

1.1. Basic concept of solar water distillation

The researchers have developed several strategies for desalinating brackish water. One of the best methods is solar distillation because it has so many advantages, including the use of free, abundant, and sustainable solar energy, the need for fewer skilled workers, the ease of fabrication using materials that are readily available locally, lower operating costs, and the absence of pollution. The sun emits electromagnetic energy, which the earth absorbs. Solar power is affordable and pollution-free.

Optimization and Modelling of EGR rate and MIS for POME fuelled CRDI diesel engine

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ARTICLE INFO

ABSTRACT

In the present research work an optimisation stuy of the Exhaust gas recirculation (EGR) rate for MIS adopted POME fueled CRDI Diesel Engine fitted with TRCC was carried out. The engine was operated with injection parameters such as 900 bar, 7 holes and $10°$ BTDC which have been optimized for better performance and lower emissions from our previous study. The experiments were carried out by employing an RSM-based D-optimal design, and the relationship between input and output was determined using an ANOVA. Using RSM-ANOVA, mathematical models were built for each result, and the predicted and actual outcomes were compared. With an R^2 value greater than 99.34%, the prediction models were discovered to have a strong prediction efficiency. The desirability approach-based optimisation was used to determine the ideal engine operating parameters. EGR rate was varied from 0% to 20% and an MIS of $40 + 20 + 40$ has been adopted for the engine. An EGR rate of 10% is optimized from the viewpoint of NO_x reduction and penalty in power output which results in a decrease in brake thermal efficiency by 2.90%, peak pressure by 4.8%, heat release rate by 8.8% and oxides of nitrogen (NO_x) by 1.35%. A drastic increase in emissions such as carbon monoxide by 5.8%, unburnt hydrocarbon by 13.3% and smoke by 20.6% was also observed. Both the ANN and RSM models correctly fit the experimental data, producing R^2 values that ranged from 95.5% to 98.5%, respectively. The findings show that RSM and ANN are both highly accurate modelling approaches. Additionally, as compared to RSM, the

Thermal Analysis of Vertical Heated Cylindrical Surface Employing V - Shape Fin Surfaces

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Abstract

Natural convection is an important and economical mode of heat transfer .It is used in many of the engineering applications such as cooling of electronic components, cooling of Printed circuit boards, HVAC & R, I.C. engines fins, radiators of automobiles etc. Some of these heat sinks are cylindrical in shape. The heat that is produced in such system that conducts through the walls surfaces is need to be continuously dissipated to the surrounding atmosphere to keep the system in steady state condition. More quantities of heat have to be dissipated from small area as heat transfer by convection between a surface and the fluid surroundings. It can be improved by attaching fins or by use of some form of extended surfaces. V shape fin geometries have been selected for cooling such cylindrical surfaces or heat sinks. Initially the dimensions for the vertical cylinder with array of v shape fins have been obtained. Computational analysis of array of v shape fins over vertical heated cylinder have been studied by using Ansys software. The results reveal that the 60-degree V-shaped fins exhibit the highest natural convection heat transfer coefficient, owing to their streamlined flow-promoting characteristics. These V-shaped fins act as flow turbulators, causing minimal air obstruction and, consequently, enhancing heat dissipation. The computational findings are further validated by comparing them with analytical results, affirming the effectiveness of this approach in improving heat transfer from cylindrical surfaces. This research contributes to the understanding and optimization of natural convection heat transfer in cylindrical systems utilizing V-shaped fins, demonstrating its potential for enhancing thermal performance in various engineering applications.

Keywords: Finite element analysis, vertical heated cylinder, computational fluid dynamics (CFD) analysis, thermal analysis.v-shape fin.

1. Introduction

Heat is a form of energy. Natural convection, an intrinsic mode of heat transfer driven by density variations in a fluid, holds significant importance in various engineering applications. Its cost-effectiveness and efficiency make it a vital component in the realm of thermal management, particularly in scenarios where heat dissipation is critical. Heat sink are widely used in electronics, automobile, mechanical, chemical, nuclear, solar, friction industry. Fins are the extended surfaces used to remove heat from heat generating devices, different shape of fins are used in practical applications such as pin fins, trapezoidal profile, rectangular, annular fins. Shape of fins plays important role in heat transfer, so analysis is done on V-shape. Many researchers studied parallel & radial fins for better heat transfer results. Sujan et al. [1] experimented on C & V shape fins and compare results, Shah et al. [2] experimented on split fin pattern and V fin pattern they obverse that V fins pattern has best effectiveness value, Senapati et al. [3] conducted experiment on heat transfer with vertical cylinder with annular fins by varying the Rayleigh number (Ra), Shah et al. [4] did analysis on CFD transient thermal by using different materials and compare their results and they found that aluminium 6061 has better heat dissipation properties. Jang et al. [5] analyzed LED bulb as a heat sink with fins and they observed that as the angle of inclination increased, the plate fins blocked the upward air flow; thus, stagnation points and flow separation appeared. Roy et al. [6] have completed experiment of CFD analysis on inclined plate fins and they observed that, the values of induced velocity tend to increase with the increase in inclination due to chimney effect, as the inclination increases from 30° to

Nano-sized mesoporous biochar derived from biomass pyrolysis as electrochemical energy storage supercapacitor

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ARTICLE INFO

ABSTRACT

Energy storage is essential to conserve and deliver energy to end-user with continuity and durability. A sustainable energy supply with minimal process losses requires cost-effective and environmentally friendly energy storage material. In this study, self-co-dopes N (3.65 %) and O (6.44 %) porous biochar were produced from pyrolysis of biomass pellets (made from garden wastes) and examined for energy storage application. The presence of co-doped-heteroatoms within the carbon matrix of biochar resulted in enhanced surface wettability, fast charge transfers, increased electrical conductivity, and low internal resistance. Biochar produced at 800 ℃ (i.e. biochar-800) showed desirable pseudocapacitive nature induced by self-co-doped heteroatoms. Two-electrode measurements in aqueous 1 M H_2SO_4 revealed that biochar-800 possessed 228F g^{-1} of specific capacitance at a current density of 1 Ag^{-1} Additionally, biochar-800 exhibited a high energy density of 7.91 Wh kg^{-1} in aqueous electrolyte and promising cycling stability with 88% capacitance retention after 5000 cycles at 10 A g^{-1}. Enhanced capacitive performance of biochar-800 was assigned to the presence of self-co-doped heteroatom, the high specific surface area of 312 m^2g^{-1}, and self-formed mesopores (pore size around 15.2 nm). This study demonstrates the great promise of porous biochar derived from biomass pellets as a low-cost electrode material for high-performance energy storage devices.

1. Introduction

The growing population and industrial energy demand, depleting traditional fossil fuels, and deteriorating environment have prompted efforts to look for sustainable energy and storage [1]. Nowadays, batteries and supercapacitors are widely used as energy storage devices. Large amounts of energy can be stored in metal-air [2], sodium-sulfur [3], and lithium-ion batteries [4], which can later be utilized when needed. Most batteries, however, work on the electrochemical cycle and hence depend on the electrode and electrolyte materials for their efficiency. Compared to the electrochemical cycle-based batteries, the supercapacitor is electrostatically controlled and shows promising features in operation and sustainability [5,6]. In the context of performance, supercapacitor holds several advantages over batteries, such as high power capacity, fast charging/discharging from several thousand to millions of cycles, but it has the constraint of low energy density [7]. Several nanostructured materials such as graphene [8,9], carbon nanotubes (CNT) [8,10], carbon nanosheets [11], graphene quantum

Improved electrosorption performance using acid treated electrode scaffold in capacitive deionization

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Abstract

Capacitive deionization (CDI) is an emerging and environmentally friendly technology for water desalination with promising future. However, co-ion expulsion is a prevalent problem during CDI operation which subsequently reduces the electrosorption performance. To address this challenge, we employ acid treated polyurethane sponge (APS) as a scaffold to fabricate the electrodes and nitrogen-doped carbon derived from camphor soot (NCS) as an electrode material. The morphological studies of APS are executed by scanning electron microscopy showing the increase in oxygen content. The contact angle measurement shows the improvement in wettability of APS. The electrochemical analysis of ordinary camphor soot and NCS are performed by cyclic voltammetry and galvanostatic charge-discharge confirming the significant enhancement in the specific capacitance with the nitrogen doping. Moreover, acid treated sponge (APS-NCS) exhibits significantly higher electrosorption capacity than ordinary sponge (OPS-NCS) owing to the mitigation of co-ion expulsion effect. Further, APS-NCS displays better cyclic stability over twenty adsorption-desorption cycles retaining 66.1% of the initial electrosorption capacity. The experimental electrosorption data fits well with Freundlich adsorption isotherm, indicating multilayer adsorption on heterogeneous surface of NCS.

Graphical abstract

Ultra-high energy stored into multi-layered functional porous carbon tubes enabled by high-rate intercalated pseudocapacitance

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Highlights

- The multi-layered, mesoposous, functional carbon tubes with a density of 1 gcm^{-3} is derived from Mushroom.

- We report a high gravimetric and volumetric capacitance of 995 Fg^{-1} and 895 Fcm^{-3} respectively.

- The cyclic performance has emphasized increasing capacitance up to 15000 cycles and sustained up to 30000 cycles.

- The stable volumetric energy density 26 $Wh.L^{-1}$ at a power densities from 2 to 200 kWL^{-1} in an aqueous electrolyte.

- The 180 $Wh.L^{-1}$ at 2360 WL^{-1} in an ionic electrolyte directs potential automobile application.

Abstract

Pseudo-supercapacitors have been pursued to realize high energy densities to compete with batteries. However, supercapacitor based on carbon fails to achieve the desired high energy density due to the surface oriented

Full Length Article

Norbornane derived N-doped sp^2 carbon framework as an efficient electrocatalyst for oxygen reduction reaction and hydrogen evolution reaction

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Abstract

Hitherto, the development of Pt free bifunctional electrocatalyst for oxygen reduction reaction (ORR) and hydrogen evolution reaction (HER) is necessary for the advancement of sustainable and cost-effective solutions for energy conversion and storage technology. In this direction, herein we elucidated the usage of N doped sp^2 hybridized carbon framework (N-CF) as a metal-free electrocatalyst for ORR and HER. This work inspects the effect of N doping that converts a hybrid structure of CF {Norbornane or bicyclo [2], [2], [1] heptane structure} into planar N-CF. A series of N-doped CF with different doping concentrations has been prepared using a facile and cost-effective technique. This robust electrocatalysts exhibits a promotional effect in the activity, porosity, thermal and electrochemical stability for the ORR and HER reactions. A rich delocalized electronic density of the sp^2 bounded N species helps in modulating antibonding state of molecular oxygen and facilitates the breakage of O═O bond in ORR. It also promotes proton adsorption via bonding between proton and valence electron rich catalyst surface to aid HER. The research sought to investigate the employability of N-CF for fabricating sustainable energy devices with electrocatalyst possessing multiple electrocatalytic activities for ORR and HER. Density Functional Theory (DFT) computations reveals that active sites for HER are carbon atom located at the edge close to pyrrolic nitrogen and adjacent to graphitic nitrogen dopants.

Graphical abstract

Current progress in thermochemical conversion of plastics into jet-fuel hydrocarbons and recommendations for COVID-19 waste management

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Abstract

A vast amount of plastics are produced globally to comply with human needs. Additionally, the COVID-19 pandemic enabled an extreme rise in single-use plastic, creating an extra burden on plastic waste handling and promoting environmental pollution. Thermochemical conversion of plastic wastes into liquid hydrocarbons would be promising in this context. Numerous literature showed plastic-to-liquid hydrocarbon fuel formation; however, jet-fuel grade hydrocarbons generation from plastics is rarely assembled and hence become the focus of the current review. Reportedly, 200 – 600°C reaction temperature, 10bar hydrogen pressure, 12 hrs retention time, and 0.13 catalyst-to-feed ratio produced jet fuel from plastics; albeit, it remained system-specific, including batch and continuous processes. Critical evaluation of several plastics to jet-fuel techniques suggested research attention in (i) complete plastic conversion into the plastic-derived oil, (ii) catalyst selection and new design enabling aliphatic/aromatics selectivity within the product mixture, (iii) mechanistic understanding of plastic to jet-fuel processes (with and without catalyst), and (iv) catalyst recyclability studies. Thermal degradation under microwave, hydrothermal liquefaction, pyrolysis, methanolysis/hydrogenation, thermal cracking/co-hydrogenation, and aqueous phase hydrodeoxygenation are possible routes for plastic to jet-fuel conversion. Catalytic pyrolysis could be a promising for plastic/COVID-19 thermochemical conversion into jet fuel, and biomass-derived catalysts may replace the expensive metal-based catalysts.

Room Temperature Sputtered Aluminum-Doped ZnO Thin Film Transparent Electrode for Application in Solar Cells and for Low-Band-Gap Optoelectronic Devices

Amol C. Badgujar,[†] Brijesh Singh Yadav,[†] Golu Kumar Jha, and Sanjay R. Dhage*

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ABSTRACT: Aluminum-doped zinc oxide (AZO) is a popular, low-cost, nontoxic material that finds application as a transparent conducting electrode in photonic, sensing, and photovoltaic devices. We report the AZO thin films with a high figure of merit on large-area glass substrates by direct current magnetron sputtering without any intentional substrate heating. Furthermore, a simple thermal post-treatment to improve the transmittance of AZO thin film in the infrared region for its application in low-band-gap devices is presented. High optoelectronic properties are obtained by optimizing oxygen content during the sputtering process. The structural, morphological, optoelectrical, and photo-luminescence characterization of cold sputtered AZO films is investigated for its latent applications. AZO thin films with an electrical sheet resistance of 8.8 Ω/□ and a visible light transmittance of 78.5% with thickness uniformity above 95% are achieved on 300 mm × 300 mm glass substrate. The AZO film with optimized process conditions is employed as a transparent electrode to fabricate a copper−indium−gallium−selenide-based thin film solar cell, demonstrating 11.8% power conversion efficiency. The AZO film with optimized sputter conditions was post-treated in ambient conditions with an Al blanket to suppress the resistivity by proper organization of the defects due to Al^{3+} consumption and point defects, resulting in improved transparency (85%) in the infrared region with a sheet resistance of 40 Ω/□. This has great potential for developing scalable and low-cost AZO thin films for transparent electrodes in a wide range of the spectrum.
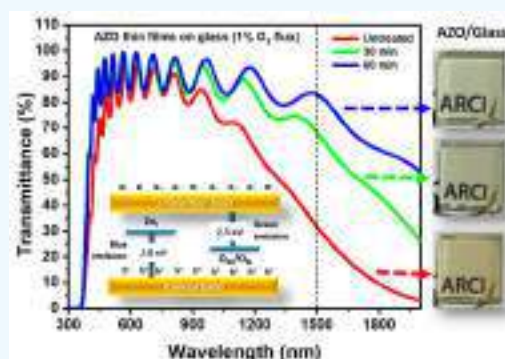
1. INTRODUCTION

Aluminum-doped zinc oxide (AZO) is an emergent prevalent transparent conducting oxide-based electrode material owing to its tunable optoelectronic properties, profusion in the earth's crust, as well as nontoxicity.[1] It has analogous electrical and optical properties like conventional indium-doped tin oxides and fluorine-doped tin oxide.[2] AZO-based thin films are widely used in photonic devices such as light-emitting diodes,[3] flat panel displays,[4] thin film solar cells,[5,6] as well as various sensing devices.[7,8] Typically, the above applications demand high transmittance (>80%) in the visible region as well as metal-like conductivity (sheet resistance <10 Ω/□). Various vacuum-based popular techniques such as sputtering,[9] pulsed laser deposition,[10] electron beam evaporation,[11] as well as non-vacuum techniques such as chemical vapor deposition,[12] spray pyrolysis,[13] chemical bath deposition,[14] and sol−gel deposition[15] are well reported for coating AZO thin films on different substrates. Most of the technique's require either high substrate temperature or thermal post-treatment to prepare AZO thin films with high figures of merit (FOM). Of the above processes, direct current (DC) magnetron sputtering[16] is an industrially acceptable technique. It can produce highly transparent conductive thin films with good scalability on a large area with a faster deposition rate. Properties of sputtered

AZO thin films are largely determined through controlled process parameters; base vacuum, gas pressure, power density, and substrate temperature during sputtering.[17] In line with this, in our earlier work, we optimized these sputtering process parameters to attain high electrical conductivity and transmission in AZO film while heating the glass substrate during sputtering.[18] However, high-temperature sputtering damages underlying layers/coatings while employing this top contact on devices; therefore, it could not be used for various temperature-sensitive devices such as organic and perovskite-based solar cells or light-emitting diodes.[19,20] Consequently, it is necessary to develop a low/room temperature DC magnetron sputtering process for producing quality AZO thin films without compromising much with its optical and electrical properties. Moreover, to advance optoelectronic properties, oxygen partial pressure during sputtering needs to be perfected

Role of Swarm Intelligence Algorithms on Secured Wireless Network Sensor Environment - A Comprehensive Review

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Abstract

Wireless Sensor Network presumed great global wide interest from organizations and researchers mainly due to their significant importance in the wireless transmission of huge information. Despite their adorable performance in obtaining effective QoS parameters, they are highly susceptible to security attacks that strongly affect the network performance and user privacy. Several security mechanisms for solving these security issues were proposed in the existing works. In recent years, emerging trends in the WSN tends to work on very complex sensor arrangement scenarios. Various limitations prevail during data collection like data aggregation, node election, load balancing etc. As a result, it is mandatory to provide strong attention for the feasibility and applicability of WSN features in accordance with the perspectives of IoT. This paper explored and depicted the security and various other problems of optimization algorithms, particularly swarm intelligence algorithm in WSN. These algorithms possess strong applicability and obtained better experimental results in resolving complex practical issues. Desirable properties of intelligence algorithms like adaptability, scalability, and robustness were discussed in this review. Highly preferred optimization algorithms like Particle swarm optimization (PSO), Ant colony optimization (ACO) and Artificial Bee colony algorithms (ABC) are deeply analyzed to provide insights on their effectiveness in WSN security. Finally, after analyzing open research and challenges, special attention would be paid in the optimization algorithm to put forward the development of security trends.

Keywords: wireless sensor network; security; swarm intelligence algorithm; PSO; ABC; ACO

1. Introduction

Wireless Sensor Network comprises a huge number of spatially distributed sensor-nodes integrated through the wireless medium for monitoring and recording physical information from environment. Secured data transmission and energy transmission are regarded as the critical designing goals for WSN. Since there is an increase in the computer network complexity, the knowledge of network based attacks seeks the attention of several researchers from various sectors [1]. So several intrusion detection systems were employed to resolve network security problems like worms, DoS, malware etc. Among intelligence algorithms, Swarm intelligence as an emerging area in optimization algorithm has more attention and its concept has been inspired by the swarm intelligence of geese, ants and other animals that display social behaviors from groups (Figure 1). These swarm intelligences would communicate indirectly or directly with each other and by utilizing these features, certain types of discrete and continuous issues could be resolved and satisfactory results might be obtained. It also possesses an outstanding effectiveness in combinatorial optimization issues. Particularly PSO, ACO and ABC have been extensively utilized with several benefits of less parameters, easy implementation etc. in power systems, neural networks, image processing, robotics and so on [2].

Security solutions could be framed at any layer of WSN stack, in which security at the lower layer depends on key management process and cryptographic algorithm for ensuring node authentication and data protection. Further security at network layer process communication security and identity authentication by data encryption. The transport layer solves issues by using two-way authentication system towards end to end security. But this is generally regulated at the application layer that sets the security characteristics on a per message basis. Security of the discussed security mechanism is highly necessary to obtain overall security. Hence the present paper focuses on providing insights to the existing protocols and standardized optimization algorithms for the detection of security gaps.

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Techno-economic assessment of manufacturing process in small scale industry to evaluate energy saving potential

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Abstract

Energy is an essential input for smooth functioning of manufacturing industry. Small scale industries employ a significant portion of unskilled labor in India. With ever increasing competition, these industries are forced to reduce their production cost. However, these industries lack the adequate expertise about monitoring the energy usage and consequently derive the benefits of reduction in energy consumption on production cost. Cost reduction through energy saving avenues becomes particularly important after facing the impact of COVID-19 pandemic on survival and growth of such industries.

This paper aims to provide a practical, grass root level perspective about utilization of energy audit as an effective energy conservation tool. This tool gives the plant management a factual idea about technical and economic feasibility of various Energy Conservation Measures (ECMs) suggested, in quantitative terms. This paper puts forth the outcomes of energy audit conducted in a small-scale industry engaged in the manufacturing of non – ferrous flat and shape wires, high precision rolling mills, slab caster etc. Energy audit was focused on energy savings in electrical as well as thermal systems.

Energy audit study revealed that this small scale manufacturing plant can save 6226kWh of electrical energy per annum, which is total saving potential of 22.82% of the plant's annual energy consumption. Suggested ECMs exhibit an average payback period of 4months which is considerably good.

Introduction

Energy is an essential input for the development of industry in any country, along with man, machine, material and money. Particularly, for a developing country like India, the energy sector is of critical importance due to ever-increasing energy needs as well as dependence on crude oil imports to satisfy the energy demand. This necessitates

Application of mixed level design of Taguchi method to counter flow vortex tube

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Abstract

A Vortex Tube (VT) creates instant separate hot and cold streams from an input stream of compressed air. However, the output of VT depends on numerous operating and geometric characteristics. Further, experimentation using all combinations of conditions is rather unrealistic, both physically and financially. Hence, a primary evaluation of VT becomes important using principles of Design of Experiments.

This research work presents methodology and results of a statistical assessment of VT's temperature separation effect through Taguchi method. This method is beneficial because it requires lesser number of trials. Present study uses L16 orthogonal array to perform the experiments for different conditions of pressure at entry to VT, cold mass fraction (μ_c) and insulation. Distinctiveness of this analysis is that statistical analysis of VT has been presented using Mixed Taguchi Design. This method represents different number of levels for control factors, unlike other designs. Lastly, confirmation experiment authenticates the usefulness of Taguchi method to predict VT's performance with adequate accuracy. Results specify that experimental efforts are reduced by 62.96% using Taguchi method.

Introduction

The Vortex Tube (VT) is a simple and compact device which was invented by Ranque [1]. It produces distinct streams at different temperatures when compressed air stream is admitted into it. Its design was further tested and improved by Hilsch [2]. Inlet nozzles arrangement convert the admitted flow into vortex flow inside the VT. Thereafter, this flow gets separated at hot end and cold end. Ratio of mass of air coming out of cold end to the admitted mass of compressed air is known as cold mass fraction (μ_c). The control valve located at hot end is operated suitably to obtain desired value of μ_c, depending on requirement of application. VT has compact size, no need of maintenance, has absence of chemical reaction and does not use environmentally harmful CFCs and HCFCs to produce cooling effect. This makes VT a suitable

COMPUTATION OF MASS-SPRING-DAMPER SYSTEM USING MATLAB

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ABSTRACT

This paper analyses impact of change in damping coefficient on oscillatory behavior of the mechanical system, which consists of mass, spring, and damper. In a control system, there are various methods to solve ordinary differential equations obtained for any mechanical system. However, those methods are quite time-consuming while studying the oscillatory behavior of the damped system. In this paper special MATLAB functions, ode45 and ode15s are used to solve the ordinary differential equation of the considered mechanical system.

KEYWORDS: Mass, spring, Damper system

INTRODUCTION

Not simply the mass-spring-damper system by itself, but many real-world systems can be modelled by it. A window will move if you thump it in the frame, although not very much, as you might hope! The window is heavy, has a resistance to motion (which is aided by the fact that it is enclosed in a frame), and is naturally springy. When you pound the system, you force it. Think of a wine glass. When you 'pong' the glass with your fingernail, you can hear how much more springy this is than the window. Hold a ruler at the end of a desk with one hand, raise the free end, and release (starting conditions: displacement = 2 cm). e.g., and zero beginning velocity). This is a nice illustration of a gently damped unforced system because the oscillations of the ruler will eventually stop. Without any forcing terms, the ruler will return to its datum position after the transient has died down. Take into account the opening of the Millennium Bridge over the Thames. It was a weakly damped system if there ever was one since it had (and still has!) mass, too much springiness, and insufficient motion resistance. When left alone, the bridge was quite content. However, it started to resonate and the oscillations built up when it was "pressed" by a large number of people walking in unison at a frequency that was similar to the natural frequency of the springy bridge.

THE MASS-SPRING MODEL

Masses, springs, and dampers are the basic building blocks used in the mass-spring paradigm to create complicated musical instruments. With the aid of finite difference techniques, each element is discretized. The network and physical equations for each component determine the system's behaviour alone. There are no additional physical equations used.

In this mass, spring and dash pot system applied force F is equal to opposing force developed by mass (Fm), elasticity (Fk) and friction (Fb).

A. Choosing a Numerical Method for Mass-Spring Systems.

We need to discretize the differential equations of the mass-spring system using a numerical method in order to simulate the vibrations of the system on a computer. What qualities should we consider while selecting a numerical approach for sound synthesis from among the numerous available? Sound waves with frequency between 20 and 20 000 Hz can be heard by humans. the sounds produced by common musical instruments including the piano, guitar, trumpet, and others. It might continue for a few seconds.

Research Articles

Comparative Analysis of Artificial Intelligent Controllers Based Intentional Islanding Algorithm for Distributed Energy Resources (DERs) in Disaster Management

M. Ankush Kumar ✉ iD & **A. Jaya Laxmi**

❝ Cite this article   ⬈ https://doi.org/10.1080/15325008.2022.2132555   ☑ Check for updates

📄 **Full Article**   🖼 **Figures & data**   📖 **References**   ❝ **Citations**   📊 **Metrics**

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Abstract

Consuming alternate power from distributed energy resources (DERs) like diesel generators (DG), renewable energy sources (RES), batteries etc., during grid

unavailability is increasing day by day. Unavailability of grid is caused due to many reasons like typical faults (LG, LL, etc.), damage to network equipment due to

STUDENTS ATTANDANCE TRACKER TO NOTIFY THE TEACHERS AND PARENTS USING MACHINE LEARNING

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ABSTRACT

Our Research" Students Attendance Tracker to notify the Teachers and Parents using Machine Learning" is a Computerized Attendance Management and Alert System (AAMAS)" was created to assist UiTM instructors and Academic Affairs Department in checking understudies' non-attendance and working on the non-appearance with recording the board. AAMAS gives different capacities, from overseeing and recording understudies' participation record, to sending programmed cautions to understudies with high truancy by means of short informing framework (SMS) and email. The framework is likewise ready to follow the quantity of alarms sent. Through AAMAS, a lot of time and cash can be saved, for example time expected to finish up structures and issue warning letters physically can be limited fundamentally. In addition, message capture, HR and human mistakes can likewise be decreased. AAMAS which was customized to UiTM could be likewise improved and specially crafted to cook other learning organizations' prerequisites all through Malaysia.

KEYWORDS: automated, management, system development, Students, Attendance, Tracker, Teachers, Parents, Machine Learning.

1. INTRODUCTION

These days, truancy from addresses by the college understudies gives off an impression of being a not kidding issue. As per [1], it shows that there is a huge positive connection between participation to class and college understudy's presentation. This shows that college understudies who come to class all the more oftentimes will have better outcomes. Non-appearance prompts low scholarly accomplishments, yet may likewise add to high dropout rates.

In the current practice, understudies will be given verbal update by their speakers assuming they neglected to go to two meetings of classes with no legitimate explanation. Then, the separate gatekeepers will get a notice letter gave by HEA once the non-attendance comes to 10%. Afterward, when it arrives at 20%, another warning letter will be given which demands the understudy to present a show cause letter. An inability to do so may bring about the understudy being banished from sitting the last assessment.

There are situations where guardians or gatekeepers raised an issue that they were not being informed or they got late notices with respect to the non-appearance of their youngsters. Presently, the warning is being conveyed by snail mail to the understudies' enrolled address. The conceivable reason for warnings conveyance disappointment could be because of progress of address or the actual understudies get the letter and didn't advance it to the guardians.

In UiTM, the interaction to monitor understudies' participation is done physically by every teacher showing a particular course. Each opportunity an understudy comes to class, the person in question should put down her mark on the participation sheet as a proof of going to the class. The teachers need to work out the level of non-appearance of the understudies to recognize understudies that arrive at specific rates. This cycle is monotonous, particularly for an enormous number of understudies. This will take times and bunches of work to flips the whole participation list for each understudy.

As cell phone is nearly considered as one mandatory device for college understudies, there is an incredible potential to use short message administration (SMS) updates for fostering a mechanized framework to work on understudies' participation in college. SMS update have various qualities that make it appropriate to be utilized as a participation alert including direct correspondence, protection, secrecy and quicker conveyance of messages and receipt of reactions. SMS informing innovation likewise permits the transmission of significant quantities of messages at the same time, henceforth diminishing HR and human blunders.

Analysis of Data Handling Challenges in Edge Computing

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Abstract

Traditional Cloud Computing networks are intensely centralized in which the data is collected at the edges and transmitted back to the central network servers for computation. Due to the dramatic increase of IoT devices, such edges lack the computational power to handle the data collection and storage over the network because of the assumption of devices located closer to the edges. Edge Computing (EC) broadens the cloud computing characteristics of gathering, storing, processing, and analyzing a massive amount of data by locating services close to the edge of the network. Yet, the unique features of Edge Computing have introduced several challenging issues in the data handling process. The paper provides an overview of the data handling challenges faced in the Edge Computing network. It defines the fundamentals of Edge Computing – the basic architecture, how it's different from Cloud Computing, its applications, and discusses the threats encountered in Edge Computing. There are various challenges experienced in EC while storing, managing, and analyzing data over the network through different local Edge Nodes. This paper summarizes the solutions to the proposed problems in EC through different machine learning and deep learning algorithms. It also provides future research directions in edge computing.

Keywords: edge computing; machine learning; deep learning; cloud computing; IoT

1. Introduction

The day-by-day increase in demand for devices has broadened the interaction between people and technology. But this massive demand for technologies has led to a huge rise in the volume of data. According to Statista, the total amount of data created, consumed, manipulated, and captured globally is forecasted to increase rapidly and will reach 64.2 zettabytes in 2020. Over the next 5 years, i.e. up to 2025, the data is projected to reach 180 zettabytes [1]. IoT services like Smart home appliances, embedded devices, and wireless networks contribute by helping people with their daily needs, so a cloud platform is provided to store this data over the network.

This cloud-based platform is a centralized network where the data from different edges are collected and stored. But with storage there are still challenges like latency, scalability, availability of storage facility, and privacy that are worrying even in the present [2]. A centralized network system in Cloud Computing delays the storage process, which introduces significant security and privacy issues [3].

Edge Computing (EC) architecture [4] provides the solution for the disadvantages of Cloud Computing by reducing the data being stored at the central system altogether. It defines nodes at edges which brings the devices closer to the network and real-time data can be stored in these edges. Further, the stored data is migrated to the main system through a wireless networking system. Because EC deploys computation and storage services closer to the end-user, the delay in the data handling process is greatly reduced. This also decreases the task of cloud networks and edge nodes can perform the storage task at edges without the need of a cloud server and the central system can perform major task handling processes, reducing the network bandwidth pressure [5].

But there are bottlenecks in the edge computing architecture [6]. As the edge servers are exposed to public places, there is a greater risk of malware injection in the servers creating a security challenge. Many IoT devices are connected directly to these servers creating an environmental awareness for the nodes. This can decrease the latency of data migration over the network and due to low-latency and narrow network bandwidth, attackers can easily invade user data privacy. EC architecture also faces major challenges in data offloading from nodes to the central system.

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Determining Soil Fertility with the Help of Capacitive Touch Sensor

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Abstract: *Soil consists of many nutrients which can be classified as macronutrients (Nitrogen, Phosphorus, Potassium) present in large quantities and micronutrients (Magnesium, Boron, Zinc, etc.) present in less or limited quantity.*

The presence or absence of the macronutrients has a major impact on the plant's growth as compared to the micronutrients. Hence, in this paper we consider macronutrients to determine soil fertility.

Currently, numerous systems are available to determine the presence of NPK values in soil that make use of electrochemical sensors, optical transducer and color sensors. Some of these sensors are accurate but are either costly or restricted to a specific soil type.

The paper suggests a methodology to use capacitive touch sensor easily available in our smartphones as they are highly responsive to low voltages ranging from 1V to 5V. These sensors are used in almost every smartphone and hence there is no need to buy any additional system for checking the soil quality making it cost effective. Farmers can use them on daily basis as they come handy along with any smartphones.

Keywords: **Soil Fertility, Nutrients, NPK, Agriculture, Nitrogen Phosphorus and Potassium, Touch Sensors, Capacitive and Resistive component, formatting, style, styling, insert.**

1. INTRODUCTION

1. Agriculture in India:

India is a land of agriculture and yet it faces many problems due to the diversity in geographical structure of the country. Agriculture plays a vital role in enhancing the country's economy. In India, agriculture contributes about sixteen percent (16%) of total GDP and ten percent (10%) of total exports.[3]

Ashish Awate*, Pratik Chavan*

Review Article | Published: 22 December 2021

Machine Learning Algorithms for Analysis and Prediction of Depression

Mohini Kilaskar, Neha Saindane, Nabeel Ansari ✉, Dhaval Doshi & Mayuri Kulkarni

Abstract

Today, depression is one of the critical mental health problems faced by humans of all ages and gender. In this era of increasing technology, it causes a life of less physical work, continuous pressure on one's life, which creates a risk of intellectual disturbance. The work culture, peer pressure, stressful life, emotional imbalance, family disturbances, and social life are resulting in depression. Depression may also sometimes lead to a heart attack. Depression causes adverse effects and becomes a serious medical problem in how individuals feel and act in everyday life. This psychological state causes feelings of sadness, anxiety, loss of interest in things and jobs, and could barely result in suicide. In this paper, the

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Tribological study of sunflower TMP ester and silica nanoparticles additives for hydrodynamic journal bearing application under boundary lubrication condition

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Abstract

Purpose

This study aims to study the tribological performance of sunflower TMP ester and silica nanoparticles additives as a biolubricant alternative to the conventional lubricants for hydrodynamic journal bearing applications.

Design/methodology/approach

Nanolubricants were synthesized using an ultrasonicator and a homogenizer. A pin-on-disk tribometer was used to simulate the boundary lubrication condition for hydrodynamic journal bearing application in the presence of the studied lubricants. Surface analysis of the pin (bearing material) was done using scanning electron microscopy and energy dispersive X-ray spectroscopy.

Findings

The sunflower TMP ester performed well in terms of the coefficient of friction compared to commercial lubricants, but its wear performance was poor. The silica nanoparticles improved the wear and friction performance of the sunflower TMP ester. With the addition of 1% silica nanoparticles to sunflower TMP ester, the

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Enhancing Tribological Properties in a Refractory High-entropy

Automatic robot Manoeuvres detection using computer vision and deep learning techniques: a perspective of internet of robotics things (IoRT)

Hemant B. Mahajan ✉, Nilesh Uke, Priya Pise, Makarand Shahade, Vandana G. Dixit, Swapna Bhavsar & Sarita D. Deshpande

Abstract

To minimize any impediments in real-time Internet of Things (IoT)-enabled robotics applications, this study demonstrated how to build and deploy a revolutionary framework using computer vision and deep learning. In contrast to robotic path planning algorithms based on geolocation. We focus on sensor-captured streams/images and geographical information to enable the Internet of Robotic Things (IoRT) to evolve. The application will collect real-time data from moving robotics at various situations and intervals and use it for

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Research Articles

Alzheimer disease classification using tawny flamingo based deep convolutional neural networks via federated learning

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ABSTRACT

Smart health-care is the recent technology, which ensures the early diagnosis and prevention to the patients in the remote area. Particularly, for the serious illness, like cardiac problems, brain abnormalities require immediate attention. Moreover, owing to the commencement of the smart systems, the data from distributed sources is bulky, which imposes the complexity to handle and degrades the diagnosis accuracy. Hence, this research proposes an innovative distributed

Breast Cancer Pathological Image Classification Based on the Multiscale CNN Squeeze Model

Yahya Alqahtani [ID],[1] Umakant Mandawkar [ID],[2] Aditi Sharma [ID],[3] **Mohammad Najmus Saquib Hasan** ✉ [ID],[4] Mrunalini Harish Kulkarni [ID],[5] and R. Sugumar [ID] [6]

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Abstract

The use of an automatic histopathological image identification system is essential for expediting diagnoses and lowering mistake rates. Although it is of enormous clinical importance, computerized breast cancer multiclassification using histological pictures has rarely been investigated. A deep learning-based classification strategy is suggested to solve the challenge of automated categorization of breast cancer pathology pictures. The attention model that acts on the feature channel is the channel refinement model. The learned channel weight may be used to reduce superfluous features when implementing the feature channel. To increase classification accuracy, calibration is necessary. To increase the accuracy of channel recalibration findings, a multiscale channel recalibration model is provided, and the msSE-ResNet convolutional neural network is built. The multiscale properties flow through the network's highest pooling layer. The channel weights obtained at different scales are delivered into line fusion and used as input to the next channel recalibration model, which may improve the results of channel recalibration. The experimental findings reveal that the spatial recalibration model fares poorly on the job of classifying breast cancer pathology pictures when applied to the semantic segmentation of brain MRI images. The public BreakHis dataset is used to conduct the experiment. The network performs

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Compendious Characterization Studies on the Physio Mechanical Behaviour of Habara Plant Fiber Fortified Epoxy Composites 2022-28-0538

The present study deals with natural lignocellulose fibril extricated from habara plant. The fibrils are found to possess high level of amorphous constituents. KOH Surface modification of fibrils at 5wt% enhanced the crystallographic index of habara plant fibers. The thermal stability of the fibers is found to be promising in comparison with unexposed habara plant fiber. The reinforcement of habara plant fibers with epoxy matrix contributed to utmost tensile and flexural strength of 79 MPa and 121 MPa. Scanning electron microscope analysis exposed the intricate surface of habara plant fibers are porous and rough in nature of the fibers subjected to KOH modification. The foresaid composites as application in automobile interior will result in reduction of land filling caused by man made fibril fortified polymer composites.

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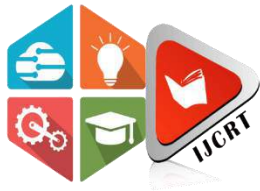
Overcoming Iot Security Challenges Using Machine Learning

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Abstract: With the rapid growth and development in Internet of Things(IoT) devices, there is an increase in cyber-attacks targeting these devices. Attackers continue to find new mechanisms and techniques for tricking systems, thereby exploiting the existing IoT-HUB for illegal purposes. Hence detection of attacks in IoT and detecting malicious traffic in early stages is very challenging due to increase in size of network traffic. Also IoT devices have low storage capacity and low processing power, hence traditional security solutions to prevent IoT systems are inappropriate. In this paper, a lightweight framework based on Machine Learning algorithms is proposed for detection of malicious network traffic. The framework uses three classification based ML algorithms, namely K-Nearest Neighbors(KNN), Support Vector Machine(SVM), Random Forest(RF) for detecting attacks.

***Index Terms* - IoT, Machine Learning, Network Attacks.**

I. INTRODUCTION

The Internet of things describes physical objects that are embedded with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet. Iot enables physical devices to see, hear and think based on the shared information without human involvement. Global spending on IOT in 2019 reached US $745 billion, and will surpass US $1 trillion in 2022. As per above prediction the Global spending raised by 24% in 2021, led by investments in IOT software and IOT security. 130 new IOT devices are connected to the internet every second. Currently, there are 30 Billion active IOT devices running over the network. The domains where IoT is integrated include military applications and operations, healthcare, industries, telecommunications, energy productions and distributions, transportation, agriculture, natural and manmade disasters, etc.

As there is wide applicability of IoT, attackers are finding interest in exploiting the IoT network. The most common attack carried out is denial-of-service (DDOS) attack. It is characterized by an explicit attempt to prevent the legitimate use of a service. A distributed denial-of-service attack deploys multiple attacking entities to attain this goal. Hence Machine Learning is the best solution that can be used for the attack detection. All the existing models and proposed methods that suggest using machine learning for attack detection have the ability to detect only a few kinds of known attacks.

Hence we are proposing a Machine Learning architecture that can detect almost all the types of network attacks and also the unknown attacks. The architecture is basically categorized in the 4 main phases i.e. 1) Traffic Capture. 2) Packet Grouping. 3) Feature Extraction, and 4) Binary Classification for attack detection. The architecture also has the ability to identify the malicious node.

There are two main types by which Cyber-analysis can be applied in Machine Learning: Signature(misuse) based and Anomaly based. In signature based analysis, the known attacks are assigned signatures (traffic characteristics), hence this method can detect only the known attacks. The only drawback is it needs frequent update of signatures. On the other hand, the anomaly based method models the network behaviour, and anything abnormal is considered as an attack. Hence it has the ability to detect the unknown attacks as well. Hence we will be combining both of these cyber analysis techniques.

We can summarize our contributions through this research as:

• Improvement in attack detection in IoT networks as the model can detect known as well as unknown attacks.

• Use of Random Forest ensures that the model can handle larger datasets, resulting in a good fit in scalability.

• Generates a lesser number of false alarms

IDENTIFICATION OF IPC FOR POLICE COMPLAINT USING NLP

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Abstract: Identification of IPC (Indian Penal Code) system is the system where the system can identify the IPC's on the basis of structured or un-structured data without human interference. There are many disadvantages which may arise due to unawareness about the law. As, the India has largest democracy where polices places important roles in providing justice and punishment, hence it is essential for them to know the IPC sections which must be imposed on specific charge. Our Indian Constitutional law is huge and complex, everyone cannot spend their time in reading and understanding it, even law professionals find it complex to understand it. Therefore, the purpose of our research paper is to present or propose such a system which will be helpful for the polices to impose the IPC sections on criminals or rule breakers without interference of lawyers as this process can be lengthy and time consuming. Here, the system uses Universal Sentence Encoder as a model. It predicts the different IPC sections on the basis of the given input. In this way, it helps to identify the appropriate amendment law (IPC). In this, by using Natural Language Processing (NLP) and Deep learning(DL) produce accurate results.

IndexTerms: Indian Penal Code (IPC), Natural Language Processing (NLP), Deep Learning (DL), Transfer-Learning, Universal Encoder Model.

I. INTRODUCTION

The Indian Penal Code (IPC) is the document which covers all the criminal activities along with their punishments which must be charged with. The objective of enabling IPC was to provide discrimination free justice, It is applicable to each and every person of India. This systems helps the polices to charge appropriate IPC on every individual breaking the rules.

It has all the aspects of criminal laws apart from these also, one can get law codes. But, these cannot be considered viable. Therefore, it is required to know about laws and act accordingly. Informing about law most correctly is the important role of any system related to law.

Earlier, there were many systems proposed but they have some limitations. [5] Due to this, we have suggested this method which is most effective than all of them; here we tried to remove all the limitations which were present in previous systems using N.

II. RELATED WORK

[1].In this paper, The author use bags of word technique to extract keyword and label with belonging IPC section and use Convolution Neural Network to train the classification model. And in output layer use Soft Max function to predict the IPC sections.

[2].The documentation is organized in tree data structure where similar keyword are map together and having ID for particular mapping keyword. In learning process machine get reward for total matching keyword from quires and from documentation. And user will rate the answer in which machine will improve itself.

[3].The author retrieve the keyword from query and match with the keyword belongs to the documents and extract the specific answer from retrieve documents through the question classification helps.

[4].As part of the abstract, each sentence is labeled with its role using one of the following classes: background, objective, method, result, or conclusion. Existing models for sentence classification based on artificial neural networks (ANNs).

[6].In these, words with similar meaning are found. Grouping of these words takes place and the query is retrieved using indexing; ranking is done on the basis of learning.

AI Chatbot for Plant and Animal Disease Detection Using Convolutional Neural Network

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Abstract: In this paper, a brand new design was projected for the effective classification of plant and animal diseases. The loss of food is primarily attributed to contaminated crops, that reflexively decreases the speed of development. the shortage of air circulation causes parcel of land for insects. to beat this, continuous observance of crops is required. the power to speedily discover and report infectious diseases animal's predominate to reducing the scale and length of the happening. This analysis involves a brand new approach to model identification of plants and animal's diseases growth exploitation giant, convolution networks, supported the classification of the image. The dataset used here consists of many kinds of plants and animals of each affected and healthy, and every one these pictures square measure collected from varied freely obtainable sources and manually. a brand new CNN model was trained and tested. our objective is to recommend an answer for observance the plant and animals and detective work the disease and disease at early stage. All necessary steps were taken to include this malady recognition model, starting with the gathering of pictures to form details and supply resolution with individual malady.

Index Terms - Convolution neural network, plant and animal's disease identification, feature extraction.

I. INTRODUCTION

II. Animal and plant diseases create a heavy and continued threat to food security, food safety, national economies, multifariousness and therefore the rural atmosphere. New challenges, together with temperature change, restrictive developments, changes within the geographical concentration and size of stockholdings, and increasing trade create this an acceptable time to assess the state of information concerning the impact that diseases have and therefore the ways that during which they're managed and controlled. the utilization of technology within the detection and analysis method will increase the accuracy and responsibleness of those processes. as an example, the those that use the newest technology to investigate the diseases that arise unexpectedly square measure at a better likelihood of dominant them than people who don't. within the recent incidence of coronavirus, the planet relied on the newest technology to develop preventive measures that have helped cut back the speed at that the unwellness is transmitted.

III. In this paper, the case is explored for AN knowledge base approach to finding out the management of infectious animal and plant diseases. The past 20 years have seen AN increasing variety of virulent infectious diseases in natural populations and managed landscapes. In each animal and plants, AN new variety of plant and fungal-like diseases have recently caused a number of the foremost severe die-offs and extinctions ever witnessed in wild species, and square measure jeopardizing food security.

IV. CNN is one in every of the many techniques in deep learning that is common for beholding in pictures and videos. it's several blessings in feature extraction and weight sharing and is simpler in terms of storage and quality. A CNN significantly has one or extra layers of convolution units that receive input through multiple units from the previous layer that altogether manufacture a proximity. Therefore, the input units (that represent a tiny low neighborhood) share their weights. Firstly, they deflate the amount of units among the network (since they're many-to-one mappings). this means that there square measure less parameters to seek out that reduces the likelihood of overfitting as a result of the model would be less advanced than a totally connected network. Secondly, the convolution units presume the shared info among the microscopic neighborhoods

V. LITERATURE SURVEY

VI. Usually, it's tough to perform disease diagnosing quickly and briefly because of the technical experience and skill needed. however the farms will diagnose these diseases exactly victimisation the disease diagnosing professional system (ADDES)[1] that may ascertain a correct enlargement of the stockbreeding trade. during this paper, the author is attempting to reinforce the diagnosing accuracy and minimize the loss by proposing a technique victimisation Convolutional Neural Network (CNN)[7]. Author's Centre of attention is on evolving a good strategy for this diagnosing issue by improvising the prevailing techniques. By segmenting and extracting the options from the unhealthy pictures dynamically, this model is certain to manufacture associate correct result. By evaluating algorithms via experiments and thru the visual image of those rules and plots, one will accurately return up with associate elaborate clarification of the malady and its cause and cure a lot of effectively.

Detecting Cyberbullying Messages on Social Media

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Abstract: Social channels have expanded in popularity as a result of the rapid advancement of internet technology, yet they have built a robust to notoriety as the most major streaming platforms in the twentieth century. An enormous amount of data and information is being returned from social networks, which is being used to develop a variety of exploratory research design for several methods of studies, such as human social behaviour, system security, and sociology. Cyberbullying is a concern that affects both college students on the internet. It has led to traumas such as suicides and depressions. The desire for content governance on social media networks is growing. Cyberbullying frequently causes chronic and disabling discomfort, particularly among women and children, and can even lead to suicidal ideation. Because of its strong negative social impact, Cyberbullying draws attention. Various cases of online bullying have happened recently around the world, such as the sharing of private chats, accusations, and vulgar insults. As a result, experts are bringing awareness to the detection of bullying speech or messages on social media. Therefore we proposed a methodology to detect the most common type of social media crimes such as Cyberbullying or online abuses that involve the exploitation of social media data. By combining linguistic communication with machine learning, the framework aims to design and build a good technique for observing online abusive and bullying texts. The goal of this study is effective applications of machine learning to develop a suitable methodology for detecting. In order for the suggested system to produce higher accuracy results, various like Naive Bayes, Random Forest, Linear Regression, and Svm Classification techniques are applied.

Index Terms - **Cyberbullying, Natural Language Processing, Machine Learning, Chat Application.**

I. INTRODUCTION

Nowadays, social media platforms such as Facebook, blogs, wikis, Instagram micro blogging, and Twitter play an important part in formal communication and unstructured communication. The tremendous popularity of social networking sites on the internet sites raises a number of key questions about their effectiveness Safety and usefulness have an impact on people's social lives. A growing number of online users are abusing the system. In addition to harassing, threatening, and frightening other users, disseminating false information, is resulting in a flood of misinformation. Incidents of Cyberbullying Sites for social networking are fantastic resources. Individual communication is important. Making use of social media however, in general, it has become more widespread over time. People come up with immoral and unethical strategies to do unpleasant things. This is something we see between teenagers and, on sometimes, between adults.

In this study, we emphasize on Instagram because it is the social media channel with the most users reporting Cyberbullying. Instagram is a popular social media platform. A platform that allows users to exchange photos and videos in a variety of ways they can communicate with their fans either publicly or privately. Instagram users have the ability to upload photographs or videos together with a text caption, geotags and hash tags to aid in the discovery of new places, their photographs. They can also follow the feeds of other users like or comment on the images of other people.

Crime occurs all across the world, for a variety of reasons increase in the number of crimes agencies of law enforcement are requiring modern information systems with the ability to contribute to the reduction of crime and the protection of society. The scientific study of crime is known as criminology. Users will now be asked if they are sure about submitting potentially harmful comments on the social media app. The site will also get a supplementary function called 'Restrict,' which will safeguard users from inappropriate encounters such that the community can 'stand up to some of this bullying. After multiple warnings for misbehaving Instagram blocks the user.

Solar Absorption Refrigeration Systems Use Productive Thermal Storage PCMs: Review

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Abstract

Composite phase change materials (PCMs) for thermal energy storage are gaining popularity due to their high latent heat storage capacity, improved thermal transfer performance, minimal volume variation, and lack of seepage. The goal of this review is to present techniques for engineering the thermal properties of composite PCMs (e.g., latent heat, thermal conductivity, durability, and thermal stability) for a variety of advanced large-scale applications and for achieving desired thermos-physical, chemical, and mechanical properties. Additionally, the methods and materials used in composite synthesis are discussed. The challenges and elements that influence composite PCMs' thermal energy storage capability are also discussed. Furthermore, the potential for generating energy storage and conversion materials, as well as current improved uses of composite PCMs (including medical, building, electronics, solar, and energy storage and conversion), are mentioned. This research will most likely serve as a starting point for the development of multifunctional organic composite PCMs.

Keywords: Solar Energy, Engineering thermal parameters, Composite PCMs, Thermal energy storage

I. Introduction

The design of composite phase change materials (PCMs) for thermal energy storage has gotten a lot of attention lately because of their high latent heat storage capability, improved thermal transfer performance, minimal volume variation, and seepage-free properties. The goal of this review is to present techniques for engineering the thermal properties of composite PCMs (e.g., latent heat, thermal conductivity, durability, and thermal stability) for a variety of advanced large-scale applications and for achieving desired thermo-physical, chemical, and mechanical properties. In addition, the methods and materials used to create composites are discussed. The challenges and elements that influence composite PCMs' thermal energy storage capability are also examined.

Furthermore, the possibility for generating energy storage and conversion materials is mentioned, as well as current improved uses of composite PCMs (including medical, building, electronics, solar, and energy storage and conversion). This research will almost certainly serve as a starting point for the development of multifunctional organic composite PCMs [1]. Due to its high energy density and capacity to store and release heat at a consistent temperature during phase shift, PCMs have gotten a lot of interest in recent years. Solid-solid PCMs, solid-liquid PCMs, and liquid-gas PCMs are the three types of solid-solid PCMs. Solid-liquid phase transitions usually result in a minor change in volume and a lot of latent heat, therefore they're well-known and commonly used.
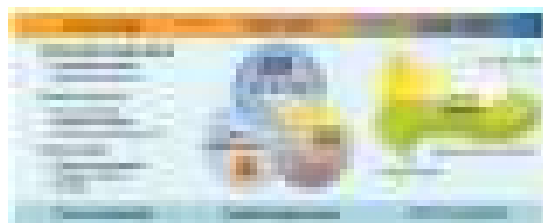
Fig. No. 1 Thermal energy management scheme for phase transition composites' thermal parameter.

PCMs that are solid-liquid can be divided into three categories: inorganic, organic, and eutectic PCMs. Salt hydrates, salt composites, and metallics are examples of inorganic PCMs. Organic PCMs include fatty acids, esters, and alcohols, as well as paraffins and non-paraffins. Organic-organic, inorganic-inorganic, and inorganic-organic pairings can all be used to make eutectic PCMs. Organic PCMs and salt hydrates exhibit phase segregation and sub-cooling; inorganic PCMs have limited thermal conductivity and segregation; and eutectic PCMs and molten salts are corrosive. Various techniques of solving these difficulties, notably for organic materials and inorganic hydrates, have been presented.

Crime Detection Approach Using Big Data Analytics and Machine Learning

Sapna Singh Kshatri[1], Devanand Bhonsle[2*], Rupal Verma[3], Anu G. Pillai[4], Vishal Moyal[5]

Abstract

The Crime Analysis phase establishes the number of crimes and other elements such as the type of crime, murder, rape, kidnapping, etc. Various data analytics methodologies used in security and criminal investigation have shown the evolution of illegal analytics over the previous three decades. First, we'll go through the various data mining tools, such as text mining, neural networks, and machine learning. Then we'll look at their recent uses in criminal analytics and the challenges that arise. Supervised machine learning classification models have been developed and applied for predictive modelling. This article uses big data and computational intelligence to forecast violent crime. This study aimed to categorize the crime prediction technique into five classes, each reflecting a different sort of crime, and assess its accuracy. MATLAB explores simple learning methods like naive byes, random tree classifiers, and meta-classifiers. 96.6% The meta-model's accuracy is that data mining outperforms another model in forecasting violent crime.

1. Introduction

With the advent of Big Data, most existing systems use a mix of Data Mining techniques (described in the appendix) to perform more accurate and reliable extractions. In terms of violence, crime analysis can encompass a vast range of criminal behaviours, ranging from minor breaches of civic responsibilities to international organized crime[1]. According to[2], Massive conspiracies are challenging to unravel, especially when information regarding accused individuals can be geographically dispersed and span more extended periods. Detecting cybercrime can also be difficult, though, given the volume of data generated by active network traffic and routine online transactions, only a small proportion is related to unlawful behaviour. The concept of an artificial intelligence system as a person is a recent development in the public discussion on AI[3].The public typically assists or collaborates with police through activity intercessions; nevertheless, the police's work does not end with apprehending the perpetrator; they also examine crime scenes, acquire evidence and data on offences and guilty parties. Additionally, the police must act preventively in hazard zones that an offender has compromised. Keeping up with demands is not an easy task; it involves the involvement of several professions. Additionally, one of these activities is guilt investigation and evaluation. Databases are a crucial strategic resource for countries in the digital economy, enhancing governments' abilities to handle social concerns and deliver appropriate public services. Big data technology is used to aid with various elements of health care, including clinical decision support, population health, and disease monitoring[4].Big data are vast and complicated collections that cannot be stored, preserved, or analyzed quickly or inexpensively using traditional data processing technology.

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Research Article

Energy-Efficient UART Design on FPGA Using Dynamic Voltage Scaling for Green Communication in Industrial Sector

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In the present scheme of the world, the problem of shortage of power is seen across the world which can be a vulnerability to various communication securities. The scope of proposed research is that it is a step towards completing green communication technology concepts. In order to improve energy efficiency in communication networks, we designed UART using different nanometers of FPGA, which consumes the least amount of energy. This shortage is happening because of expanding of industries across the world and the rapid growth of the population. Therefore, to save the power for our upcoming generation, the globe is moving towards the concept and ideas of green communication and power-/energy-efficient gadget. In this work, a power-efficient universal asynchronous receiver transmitter (UART) is implemented on 28 nm Artix-7 field-programmable gate array (FPGA). The objective of this work is to reduce the power utilization of UART with the FPGA device in industries. To do this, the same authors have used voltage scaling techniques and compared the results with the existing FPGA works.

1. Introduction

In recent times, it has been observed that the whole globe is suffering from one serious problem which is power deficiency. This is happening all over the globe due to the vast increase in the population as well as industrialization. Therefore, to save power for our upcoming generation, the whole world is going towards the concept of energy-/power-efficient gadgets and green communication technology. The "green communication" refers to methods for conserving energy resources for future generations without affecting current generation use. As a result, UART may be useful in developing green communication concepts. Our research work is a step towards fulfilling the designs of green communication technologies. The green communication enables

totally better idea of working, interacting, and cooperating, allowing corporations to go further while reducing pollution, greenhouse gas emissions, and power usage. Many organizations are reluctant to make the switch due to the high initial expenditures. We created UART utilizing various nanometers FPGA, which consumes the least amount of energy, in order to minimize energy usage in communication networks. UART is an abbreviation for universal asynchronous receiver transmitter. UART has a frequency of 1 GHZ, a responsibility cycle of 50%, and a time period of 1 ns. The responsibility cycle of a signal is the amount of time it is used. The power and duty cycle relationship = (PW/T) 100, where D is the responsibility cycle, PW is the pulse width, and T is the signal's time period. In UART, data is sent at a particular frequency called Baud rate. In the UART time

Innovations in Water Treatment Technology in Colder Climates

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Abstract

Life, social and economic progress, and biological systems all depend on water. To ensure clean, safe, and readily available water for industrial processes, drinking water, and sanitation, a well-designed water treatment and distribution system is necessary. Innovative approaches to address the particular difficulties of cold climates have led to the development of winterization systems, membrane technologies, ice-resistant infrastructure, sophisticated monitoring, and certain chemicals. These solutions guarantee the preservation of water quality and a steady supply of safe drinking water. Urban water treatment technology is essential to public health, sustainable development, and providing huge populations with clean and safe drinking water. Water distribution systems can be effectively managed with the help of Geographic Information Systems (GIS), which analyse water flow, pressure, and tank levels to handle problems like leaks and water scarcity. Water treatment plants have become more resilient and efficient in recent times, which makes them ideal for cold climates. Examples of these advancements include membrane technologies, ice-resistant infrastructure, winterization systems, energy-efficient heating, and intelligent monitoring systems. The need for low-carbon solutions has grown as the globe struggles with climate change, particularly in the heating sector. Particularly in cold alpine regions, water source heat pumps, compression-assisted adsorption thermal batteries, and wastewater-source heat pump systems provide economical and ecologically beneficial heating options. A sustainable solution for cold climates can be achieved by combining air source heat pumps with solar collectors, which will increase heat collection and heating efficiency. Studies conducted on ground source heat pump (GSHP) systems in frigid northern regions have demonstrated how crucial it is to maximize storage volume and collector area for optimal operation. Sustainable water use and renewable energy sources are becoming more and more important to the water business, with some countries striving for net-zero emissions. Constructed wetlands (CWS) are one of the innovative watershed management solutions that are utilized for nutrient absorption, biomass production, groundwater replenishment, sewage treatment, and toxicant management. Reliability in polar regions depends on improvements in pipeline grades and particularly cold-tempered steels. Cold areas can benefit from the use of hydrogels, especially those based on cellulose, as they have shown promise in purifying water by absorbing impurities and preventing bacterial development.

1. Introduction

Water is a basic component of life and is necessary for the development of social and economic structures as well as biological systems. It is essential to many facets of human life,

Development of Flood Hydrograph for Un-gauged Catchment using SUH Approach – A Case Study of Patalganga River Basin

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Abstract

Peak Flood Discharge (PFD) estimation at a desired site on a river is critical for the planning, design, and management of hydraulic structures including dams, bridges, and barrages, as well as the design of storm water drainage systems. These include different types of floods such as standard project flood, probable maximum flood and design basis flood. In case of large river basins, the hydrological and stream flow series of a significant duration are generally available. However, for ungauged catchments, more data is not available other than rainfall which may also be of shorter duration. Therefore, in such cases, statistical analysis by fitting probability distribution to the rainfall data needs to be carried out for the estimation peak flows. Synthetic unit hydrographs (SUH) based on catchment characteristics can be used as a tool to produce flood hydrographs from rainfall records, especially in such catchments. In the present study, SUH based approach has been used to develop flood hydrograph for ungauged catchment. The method employs the unit hydrograph suggested by Central Water Commission (CWC), India. Watershed delineation and estimation of various catchment parameters for the computation of peak flow was computed using geographical information system (GIS). The flood peak value for 50-yr and 100-yr return period was found as 1057 m^3/s and 1152.36 m^3/s respectively. The results of study concludes that SUH method able to estimate hydrological parameters including peak flow discharge and can be utilized for the computation of design flood in ungauged catchments.

Keyword: Synthetic Unit Hydrograph (SUH); Design flood; Flood hydrograph; Ungauged catchment; Geographic Information System (GIS).

4410

1. Introduction

Estimation of Peak Flood Discharge (PFD) at a desired location on a river is important for planning, design and management of hydraulic structures such as dams, bridges, barrages and design of storm water drainage systems. These include different type of flood such as standard project flood, probable maximum flood and design flood. In case of large river basins, the hydrological data and stream flow series of a significant duration are generally available. However, for ungauged catchments, more data is not available other than rainfall. The rainfall data is also of shorter duration and may

become an important input in derivation of PFD. For arriving at such design values, statistical analysis by fitting probability distribution to the rainfall data needs to be carried out[1].

In India, most of the watersheds below 500 km^2 are ungauged or sufficient hydrological data is not available [2]. In surface hydrology, estimation of peak flood for ungauged catchment is one of the utmost recurrent applications in general and rainfall-runoff modelling in particular. In the catchments likely to be flooded, it becomes necessary to estimate the peak flood discharge from each

Indian Civil Engineering Consultancies' Prospects for Global Expansion: Opportunities and Challenges

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Abstract-

The viability of Indian civil engineering consulting services for overseas clients is a crucial subject to research because it may provide light on the difficulties and chances that Indian consulting businesses may encounter in the international market. The purpose of this study is to determine if Indian civil engineering consulting services for overseas clients are feasible. According to the findings of our study, Indian civil engineering firms have been offering their services to clients overseas for a while. Our study compares Indian civil engineering consultancies' services to those of their overseas competitors. The subject is crucial since it might assist overseas consumers in getting affordable and efficient quality civil engineering services from Indian consultancies. Our study's findings may be extended to a number of other fields and may encourage the use of Indian consultants on civil engineering projects. Through this study, we want to further internationalization techniques in the field of civil engineering and open new doors for improved international cooperation.

Keywords-Feasibility Study, Market Research, Financial Viability, International Business Ethics

4834

I. INTRODUCTION

The feasibility study aims to assess the viability of an Indian Civil Engineering Consultancy in Structural design & Estimation & Costing services to US based clients. In an era marked by globalization and cross-border collaborations, this learning aims to comprehensivelyassess the sensibleness and viability of extending the consultancy's services to international clients(Ock, J. H., & Kim, H. J. 2016).

By examining the feasibility of such an expansion, this project intends to provide valuable insights into effectively navigating the complexities of international collaborations within the field of civil engineering. This helps as the footing for understanding the challenges, opportunities, and best practices involved in catering to foreign clients. Studying construction dynamics is a demanding field that deals with civil engineering consulting on a global scale. Its aim is to deliver engineering and consultation solutions to foreign customers. In addition to civil engineering principles, this profession necessitates a thorough grasp of cultural, governmental, and commercial considerations in the marketplace. Addressing the distinctive needs and obstacles of foreign lands is the principal aim of Civil Engineering Consulting for international patrons, as it aids in the development, design, and execution of infrastructure ventures.

The problem statement highlights the pivotal issue at hand i.e., understanding and overcoming the obstacles that an Indian consultancy might encounter when serving clients from diverse geographical and cultural backgrounds (Shenhar et al., 2016). Surveys will be administered to both domestic and international civil engineering professionals to gather insights into their perceptions of cross-border consultancies (Dillman et al., 2014). Analysis will involve evaluating successful case studies of consultancies that have successfully navigated international expansion (Shenhar et al., 2001).

Sisal Fiber as an Economical and Ecologically Sound Material

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Abstract:

In order to better understand the impact of sisal fiber as a fiber reinforcement composite and enhance both its static and dynamic properties, an experimental program was started. The results of this experiment indicate that sisal fibers should be utilized whenever possible since they enhance the qualities of concrete while also assisting in the prevention of environmental deterioration. Up until now, natural fibers have been more conventional than technical when it comes to reinforcement materials. This research examines the experimental work conducted on Sisal fiber reinforcement composites to enhance their mechanical properties while mitigating environmental degradation and demonstrating their viability as an economical and environmentally friendly material. The application of plant fibers is creating jobs. Natural plant fibers are added to conventional concrete to improve its qualities, and their use is creating jobs in the rural sector.

Introduction

Sisal has several benefits, including the ability to flourish in waste areas and provide good fiber consistently for six to eight years with the least amount of management.

Sisal is not grown in India, and the industry is disorganized. However, a joint approach was used to do so by the District Rural Development Agency (DRDA) and the JawaharRojgharYojana (JRY).Sisal fibre has superior mechanical qualities and is recyclable, which makes it a viable raw material for composites that are utilized in the construction, automotive, railroad, geotextile, and packaging industries, among other industries. Composite materials reinforced with sisal fiber, such as wood substitute products, doors, panels, and corrugated roofing sheets, are made to be durable and reasonably priced, making them attractive to potential investors and entrepreneurs in areas susceptible to natural disasters like floods, tsunamis, and earthquakes.

Most residential construction interior wall partition systems currently in use are constructed from clay and cement sand bricks, which need to have 20 mm plaster applied on both sides. These have the inherent drawbacks of a large load, limited productivity, significant waste, and the need for expert labour in their application, yet they are easily accessible and reasonably priced to build. Additionally, aerated concrete blocks are being used. This material is brittle, fragile, and has a high water absorption rate, while being determined to be lightweight, having strong fire resistant So, in comparison to the conventional plastering of brick walls, the development of an alternative material, such as a natural fiber reinforced panelling wall, is anticipated to give better improvement in terms of the weight, speed of erection, and superior quality. In the building business, the use of fiber-reinforced cement in plasterboards for wall partitioning has gained widespread acceptance.

Materials and Method:

Sisal fiber reinforced cement composites were made for this study and tested for bending strength and compression strength on days 3, 7, and 28. moisture level and absorption of water. Twelve distinct ratios of cement, fly ash, gypsum, and sisal fibers were combined. These mixtures were mixed with water in accordance with the workability requirements, and specimens measuring 300

Assessment of Fly Ash Concrete Strength using Ultrasonic Pulse Velocity and Rebound Hammer

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Abstract –

A destructive and non-destructive test (NDT) is presented to assess the effect of adding fly ash as a partial substitution of cement in concrete. Destructive strength tests, as well as ultrasonic pulse velocity (UPV) and rebound hammer (RH) methods, were employed to evaluate the strength of concrete with different percentages of fly ash partially replaced. Based on trials done, the w/c ratio of 0.5 is taken for all mixes. Concrete cubes with combinations of 10%, 20%, 30%, and 40% of fly ashreplacement with cement were cast and tested for a period of 7, and 28 days respectively. The compressive strength and RH reading were observed to increase with the age of curing days. It was also observed that the strength of concrete decreases as the fly ash ratio increases. However, the changes were seen as minor by replacing up to 30% and the strength started to gradually decrease after the replacement of above 30% of cement with fly ash.

Keywords: Strength assessment, Destructive test, Non-destructive test, Replacement of fly ash.

9616

I. Introduction

Now-a-days, the rapid growth in infrastructure has accelerated the demand for smart and sustainable construction and improvisation in both materials and technology. Concrete has a huge impact on the environment, as a greater part of its constitution is cement, which is a material that releases high levels of carbon dioxide [14]. It may be possible for concrete construction to face the bottom-most effect on the environment if the consumption of cement is decreased essentially by the computation of supplementary cementitious materials like fly ash without giving up on the durability quality [17].The toxic gas emissionduring the production of OPC is of great environmental consideration causing global warming and health hazards [18]. Alternately, fly ash is amply obtainable as a consequence of coal-fired thermal power plants causing substantial environmental issues in view of its safe disposal. Thus, adopting fly ash in the manufacturing process of concrete would distribute adaptable purposes with OPC and fly ash disposal problems. High-volume fly ash (HVFA) concrete construction is thebest alternative as it is economical and

environmentally friendly [16]. In the early ages, the strength of HVFA concrete seemed low, but progressively, it achieved enough strength as a result of the pozzolanic reaction between fly ash and cement particles [14]. According to researchers, fly ash (FA) minimizes the unfavorable eco-friendly effect of concrete by practicing cement substitution [17]. It verified that practicing FA is an acceptable selection for cement replacement and a potential technique to build up the ecological performance of the concrete industry. A lot of investigations have aimed analysis to study the inclusion of fly ash (FA) as cement substitution in concrete. Several researchers achieved that combining and replacing FA with cement can enhance the properties of concrete and produce environmentally friendly concrete [19]. Fly ash has turned into an important admixture for generating superior pavement-quality concrete and the same can be used in the layout and construction of low-figure rural roads. Fly ash makes concrete workable, increasing its level may reduce water demand and superplasticizers' needs [18]. The aim of this paper was to review

A Comprehensive Review of the Utilization of Copper Slag as a Partial Replacement for Sand in Cement Concrete: Environmental and Engineering Implications

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Abstract

This Study focuses on the Properties of copper slag, as a partial replacement of sand for use in cement concrete. The use ofcopper slag in cement concrete provides potentialenvironmental as well as economic benefits for all related industries, particularlyin areas where a considerable amount ofcopper slag is produced. This paper reviews the Properties of copper slag and its effects on the engineering properties of cement, mortars and concrete. In this work, the concrete grade M40 selected and IS method is usedfor mix design. The various strength of concrete like Compressive, flexural and split tensile test for various replacements offine aggregate using copper slag that are 0%, 15%, 30% 45%, 60% 75% ,90% and 100%. Allspecimens cured for 7,28 days. By using the copper slag in construction field, the chance of getting pollution due to copper slag will be reduced and Itwill be the cost effective method for any construction industry. Certain previous investigations by different researchers were referre d and with certain degree ofvariability the same is incorporated into the present study.

1506

1.   Introduction

Copper slag is an industrial waste material generated from the process of producing copper. It is estimated that about 1000 tons of copper slag are produced per day along with the conventional copper products (Hemalatha et al., 2022). Copper slag has been used for various purposes, such as sand blasting, abrasive tools, road construction, etc. (Laskar et al., 2022). However, a large amount of copper slag remains unused and poses environmental and health hazards. Table 1 shows major copper industries in India.

Revolutionizing Structural Damage Identification and Health Monitoring in Civil Infrastructure with Deep Learning

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Abstract. The use of deep learning techniques to the fields of damage diagnosis and structural health monitoring (SHM) in civil infrastructure has garnered significant attention recently. There is an increasing demand for more efficient repair and management of aging infrastructure, and timely and accurate diagnosis of structural deterioration is essential to preserving public safety and optimizing maintenance resources. A succinct synopsis of the use of deep learning techniques for SHM and damage detection in civil infrastructure is provided in this work. The first section of the introduction covers the many aspects of deep learning and how important it is becoming to track structural health. We investigate how structural damage detection can be made more accurate and efficient by utilizing deep learning techniques like neural networks and data analytics. While highlighting the advantages of deep learning implementation in SHM, it is unafraid to mention the challenges associated with this innovation. Technical challenges, data needs, and ethical limitations are only a few of the challenges that academics and practitioners must overcome in order to fully fulfill the promise of deep learning in structural health monitoring.This article looks ahead, offering insights into potential future paths and opportunities in addition to presenting the current state of affairs. It demonstrates how deep learning has the ability to totally alter how we monitor and maintain essential infrastructure, not just make it simpler.
Keywords: Structural Health Monitoring (SHM), Infrastructure Maintenance, Neural Networks, Deep Learning, Damage Detection, Data Requirements

1. Introduction

Large bridges, dams, and skyscrapers are some of the civil engineering structures most vulnerable to deterioration that renders them unusable. This unbreakable cycle requires urgent maintenance [1-3]. On-site investigations still call for the erection of structures or the closing of bridges in order to carry out the required checks. Many scholars have proposed various forms of systemic health monitoring (SHM) protocols. SHM is a relatively new technology that has emerged in the last few decades. Structure-based health monitoring is one of the main applications of new sensor growth (SHM). Damage that is discovered as soon as feasible can be fixed more swiftly and for less money.In recent decades, engineers and scholars who are still in active practice have placed a high priority on safety and the necessity of lowering inspection costs. Many forums have stressed the significance of economic systemic health surveillance (ESM) in order to guarantee long-term structural stability and safety [5-7]. Different types of modern SHM technologies (use-echo impact, ultrasound surface waves, soil penetrating radar, and electric resistance) [8–10] can expedite frequent inspections and lower the direct and indirect costs associated with needless ageing failures in addition to conventional inspections and non-destructive tests. Any approach or framework related to SHM starts with sensors and sensor data, or observable reactions.

Deep learning approaches have attracted a lot of interest recently in the areas of damage detection and structural health monitoring (SHM) for civil infrastructure. The diagnosis of structural deterioration in a timely and precise manner is essential to maintain public safety and maximize maintenance efforts as our aging infrastructure requires more and more repair and management.

Table 1: The Need for Structural Health Monitoring

Challenges	Importance
Aging infrastructure	There are several old-fashioned buildings, tunnels, bridges, and dams scattered across our cities. But as they get older, these structures are more prone to damage and decay.

Estimation of Non-Revenue Water for Irrigation Systems: A Comprehensive Review

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Abstract

Water utilities worldwide have long been concerned about Non-Revenue Water (NRW), affecting water resource management and economic sustainability. The estimation and management of NRW in irrigation systems have received less attention than NRW in municipal water delivery systems, which has been the subject of much research. The goal of this review study is to compile and summarize the body of research on NRW estimation for irrigation systems, emphasizing the difficulties, approaches, and recommended practices related to NRW measurement and reduction in agricultural settings. This research adds to a better knowledge of the intricacies surrounding NRW in irrigation. It provides insights for more effective use of water in agriculture by giving a thorough assessment of the state of the art.

Keywords: Non-Revenue Water, GIS, Water Audit, Losses.

1514

Introduction

Water is a priceless resource that is necessary for both life and agriculture, which is the foundation of the world's food production. Water lost or unaccounted for throughout the transfer from the source to the application point without producing income is referred to as non-revenue water (NRW). Although NRW management has been a major issue for municipal water supply systems, more needs to be known about the parallel NRW difficulty for irrigation systems. This review examines the complicated field of NRW estimation for irrigation, elucidating methods, intricacies, and the urgent necessity of addressing NRW losses concerning agricultural water use.

NRW is an important issue because of its significant impact on the sustainability of water supplies and its financial ramifications. Physical losses like leaks, seepage, and evaporation, as well as perceived losses via illegal abstractions and inaccurate metering, can all lead to high NRW levels. The kind of irrigation system, the temperature, the water source, and regional customs all affect how much NRW there is. Since agriculture uses the most water worldwide, efficient NRW management in irrigation can significantly reduce water consumption, optimize resource allocation, and improve the sustainability of agriculture both environmentally and economically(*Water for Sustainable Food and Agriculture A Report Produced for the G20 Presidency of Germany*, n.d.).

Although there has been tremendous advancement in the management of NRW in urban water delivery systems, the irrigation industry still needs to improve. A sophisticated method must be used to estimate NRW in irrigation, considering large-scale water

Study of Allowable Bearing Capacity Using Standard Penetration Test

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Abstract-
By using an excavated pit of varying depths, the study and research aim to determine the Allowable Bearing Pressure and the profile of soil according to the required depth for the selected site. In fact, it is a field method for collecting soil samples beneath ground at varying depths to analyze soil properties within a laboratory. collected soil samples from excavated pit for shorter depth and bore hole for great depth maybe disturbed orundisturbed in nature. soil samples obtained using a split spoon sampler and the standard penetration test as per IS 2131-1981.There are many distinct kinds of soils are available on Earth, and each one has its unique properties. the safe bearing capacity or allowable soil pressure is very useful while deciding the type of foundation to Structural designer. The soil's SBC value is incredibly beneficial to structural designers. The SBC value is calculated in this study using the Teng's method, Peck Hazen Method and IS 2131.

KEYWORDS- Allowable soil pressure, Soil Bearing Capacity, Liquid & Plastic Limit. Soil Sample Peck& Hazen Method, Teng's Method

Introduction-
The term "bearing capacity of the soil" refers to the earth's ability to support structural loads that originate from the foundation. The ultimate bearing capacity of the soil is defined as the gross pressure of the soil at the foundation's base that causes the structure to fail. The safe bearing capacity of soil is determined by dividing the ultimate bearing capacity by a specific safety factor.

Significance of Bearing Capacity of Soil
Whether a foundation is deep, shallow, or machine-based, its bearing capacity is a key consideration. The structural designer determines the structural load that the soil can support based on the soil's bearing capacity. This determines the kind of foundation. If the type of foundation is chosen at the outset, the project's financial status is determined.

Scope of Test-
 1. test pits observation and preparation of ground profile.
 2. Sample Collection on Test pit -1
 3. Determination of Soil properties like field density, specific gravity, water content, Atterberg's limits, shear strength parameters

Methodology-
Engineering analysis of the subsoil was performed to determine safe bearing capacity of soil. Parameters obtained are based on **visual observations, field** and laboratory **tests.**
The field and laboratory work were executed generally in accordance with the I.S. specifications listed below.

- IS - 1498: Classification and identification of soils for general engineering purpose.
- IS – 2720 (I): Preparation of Dry Samples for various Tests.
- IS – 2720 (II): Determination of Water Content.
- IS – 2720 (III): Determination of specific gravity of soil
- IS – 2720 (IV): Grain Size Analysis
- IS – 2720 (V): Determination of Liquid and Plastic Limit.
- IS – 2720 (XIII): Determination of shear strength parameters of soil by Direct Shear Test.
- IS – 2131 : Method for standard penetration test for soil

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Hydrodynamic Cavitation: Its optimization and potential application in treatment of Pigment Industry Wastewater

Sanyukta Singh [a], Shrikant Randhavane [b]

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Abstract

Paper presents the application of Hydrodynamic Cavitation technique in reduction of Chemical Oxygen Demand (of Chemical Oxygen Demand (COD) and its various fractions from the Pigment Industry wastewater. Orifice plate with dimension of single hole of 1.5 mm is used in this study. The sample were analyzed at different pressures of 2 bar, 3 bar, 4 bar, 5 bar and 6 bar at different time intervals of 30 min, 60 min, 90 min, 120 min and 180 min. The optimum time and inlet pressure for maximum COD reduction is obtained at 5 bar and 120 min. The samples are analyzed in two stages. In stage first stage, samples are treated with hydrodynamic cavitation only and filtered thereafter. Both the unfiltered and filtered samples were analyzed for various parameters such as COD (filtered and unfiltered), BOD (filtered and unfiltered), TDS and pH. In stage two, the samples are treated with aeration for optimum time followed by Hydrodynamic Cavitation. The optimum time of aeration was obtained at 36 hrs. Response Surface Methodology was used to check the sensitivity of the Hydrodynamic Cavitation set up. Optimization using RSM provided optimum results with desirability 0.798 when pressure was at 5 bar and time of reaction was 120 min.

Graphical abstract

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Introduction

Examining the Current Water Treatment Facility and Planning for Increased Capacity at MIDC, Waluj, Chhatrapati Sambhajinagar

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ABSTRACT

Now a day's water shortage is the consuming issue. As it is very clear that there is everyday expansion in populace, the interest for water likewise increments to fulfill the requirements of the local area there comes a need to upgrade the current treatment plants, or plan the new treatment plants. Overhaul or configuration incorporates pressure driven plan and cycle of treatment of water in the plant. By and large water can be treated in treatment plants for eliminating destructive substances present in it. The treatment interaction incorporates pretreatment, air circulation, coagulation, flocculation, sedimentation, filtration, fluoridation, molding and sanitization.

Aim of study was to design the water treatment plant for MIDC, Waluj, Chhatrapati Sambhajinagar. The source of water is Jayakwadi Dam. The properties of water changes in light of its surface source. In this manner there is a ton of significance to plan treatment plant to Waluj, Chhatrapati Sambhajinagar. Tests performed are physical, chemical and biological test to check the nature of water provided by the water treatment plant.

This Project incorporates the detail of the treatment units present in the current water treatment plant at MIDC, which are 9 altogether, and anticipating the rising interest of water. This venture includes all the plan estimations for the new treatment plant and furthermore the plan rules on which these have been planned.

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2920

Ground Water Contamination and Remediation: Assessing Risks and Solutions

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❖ Abstract

Groundwater contamination poses a significant environmental and public health challenge. This abstract provides an overview of the issues surrounding groundwater contamination and the strategies for assessing risks and implementing effective solutions. Groundwater contamination can occur due to various sources, including industrial processes, agricultural activities, and waste disposal. Contaminants, such as heavy metals, pesticides, and hydrocarbons, can infiltrate aquifers, posing risks to ecosystems and human health. The assessment of groundwater contamination risks involves comprehensive site evaluations, risk characterizations, and a thorough understanding of hydrogeological factors. Knowledge of contaminant migration and behaviour in the subsurface is crucial for decision-making. Remediation strategies include source control to prevent contamination at its origin, containment measures to isolate affected areas, pump-and-treat systems for contaminant removal, and natural attenuation where natural processes mitigate contamination. Innovative technologies offer promising solutions, while ongoing monitoring and regulatory compliance are critical for long-term success. A multidisciplinary approach, integrating geological, environmental, chemical, and biological expertise, is required to address groundwater contamination comprehensively. Proactive efforts and sustainable practices are essential to protect this invaluable resource, prevent environmental degradation, and safeguard public health.

1022

❖ Study area

It appears that you are interested in a study area related to groundwater contamination and remediation in the Dhule region. Dhule is a city located in the Indian state of Maharashtra. Groundwater contamination and its remediation in a specific region like Dhule can be influenced by various local factors, including industrial activities, agricultural practices, and geological characteristics. To conduct a study on groundwater contamination and remediation in the Dhule region, you would typically follow these steps:

Site Assessment: Begin by conducting a thorough site assessment to identify areas with groundwater contamination. This involves installing monitoring wells, collecting water samples, and analysing the data to determine the types and concentrations of contaminants present.

Hydrogeological Analysis: Understand the hydrogeological characteristics of the Dhule region, including aquifer properties,

Computer Vision in the Field of Electrical Engineering: A Review

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Abstract: There is no doubt that electricity is an extraordinarily strong form of energy that is utilized to power machinery, lighting, tools, electronics, and other objects that we use in our daily lives. But what actually makes all this possible is a reliable power system network, and the equipment present in the network are what make up a power system. They can be a part of Generation, Transmission, or Distribution system. Any damages in any equipment of the power system network adversely affects the balance of the whole power system. These damages can often be detected by simple observatory inspections, where a technician or an engineer checks the outer surface of equipment to find any damage. Sometimes though, due to human error or negligence on the worker's part can leave a damaged equipment undetected till it's too late. This can lead to an even greater damage which in terms increases the losses. To avoid this from happening we could apply computer vision as well as image processing to do the same work that a technician does. It can also be applied for maintaining same work that a technician does. It can also be applied for maintaining optimum parameters of various different equipment that is usually a technician or an engineer's job. The parameters such as temperature, voltage, current and oil level of an equipment are monitored, processed and recorded. For this purpose, we use camera sensors as well as image processing algorithms.

Keywords: Cryptocurrency, Bitcoin, Encrypted, Currency, Bitpay, Exchange Rates

Introduction

One of the most effective and appealing forms of AI is computer vision, which you've almost certainly encountered in a variety of ways without you realizing it. Computer vision is a branch of computer science that focuses on duplicating aspects of the complexity of the human visual system and enabling computers to detect and analyze things in photos and videos in the same manner that people do. Artificial intelligence has made enormous strides in recent years, and is now capable of outperforming humans in various tasks involving detection and labelling. This is due to developments in deep learning, neural networks, and artificial intelligence. If AI gives computers the ability to think, computer vision gives them the ability to see, observe, and comprehend. At a high level, any technology is embraced because it improves something. Something slower becomes significantly faster, expensive becomes cheaper, manual becomes automated, difficult becomes easy, and something unsalable becomes scalable. And well, computer vision is a technology which helps in doing just that!

The quantity of data that we produce today, which is subsequently utilized to train and improve computer vision, is one of the key elements influencing the development of this technology. The processing capacity needed to analyze the data is now available, together with an enormous volume of visual data (each day, more than 3 billion photographs are posted online). The accuracy rates for object recognition have increased along with the development of new hardware and algorithms in the computer vision sector. Today's systems are now 99 percent accurate, up from 50%, making them faster than humans at responding

Analysis of Single Axis Solar Tracking System

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Abstract: Our country's need for energy is rising in due to its expansion and development. Renewable energy sources and environmentally friendly energy generation should go hand in hand with this. Solar energy is an important primary energy source, especially in rural areas. The goal of the project is to develop and explain how to use an Arduino Uno for real-time monitoring in order to track the sun and maximize efficiency. While there are many tracking system approaches, the focus of this paper is the single-axis solar tracker due to its benefits, which include low cost, low maintenance, good efficiency, and a straightforward design. There are three subsystems in this system. 1) Mechanical system: a tracking system platform 2) Electrical system: motor drive control system, stepper motor, photovoltaic system, Arduino, and LDR. Its efficiency has been evaluated and contrasted with that of stationary solar panels. This paper describes the design of a low-cost solar tracking system.

Keywords: Photovoltaic solar cell, LDR, Arduino, DC motor, and solar tracker

Introduction

We are all aware of the critical role that electricity plays in our daily lives. Electricity is a necessity for everyone. Electricity is necessary for all production facilities, industries, research centers, etc. in order to meet our needs and further our development. However, using electricity is one of the necessities of modern life. Although there are numerous ways to generate electricity, it is crucial that the sources we use don't pollute the environment. Thus, we have a plentiful and limitless source of energy that is best utilized for producing electricity; we call this kind of energy a "Renewable Source of Energy." Almost everywhere in the globe has access to free solar energy. A number of researchers are looking into ways to make photovoltaic systems more efficient. The electricity can be produced by employing fixed solar panels, but since the earth's position is known to change throughout the day, these panels are unable to capture the sun's rays continuously. When sunflowers move, they follow the sun's path. As result, in order to solve this issue. In order to align the panel with the direction of the sun's rays, a solar tracking system is required. Solar panels will be rotating according to time with the rising sun and setting positions to produce their maximum output for the day.

A large number of the solar panels were fixedly placed, like on a roof. This is not the best approach because the Sun is a moving object. One way to actively track the sun is to move the solar panel in the direction of the sun using a sun tracking device. Maximizing the efficiency of the solar cells is the main objective of this project. The typical large-scale solar-tracker is not appropriate for residential use. Consequently, this project will create a low-cost solar cell sun tracking system specifically intended for residential used. There are many different kinds of solar trackers available and the majority of them make use

Renewable Energy Powered Sustainable Home

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Abstract: Sustainability improves the quality of our lives, protects our ecosystem, and preserves natural resources for the next generations. In the corporate community, sustainability is related to an organization's comprehensive approach, considering all, from manufacturing to planning to consumer service. Reduced production of waste and the rationalization of production and energy consumption must also be implemented. The idea of sustainable development is based on a set of demands. Power that can be replenished within a human lifetime and so cause no long-term damage to the environment. Sustainable energy includes all renewable energy sources, such as hydroelectricity, biomass, geothermal, wind, wave, tidal, and solar energies.

Keywords: Sustainable Development, Renewable Energy Sources, Solar Energy, Daylighting

Introduction

In our day-to-day life, the population increases throughout the year. So, the requirement is increasing. So, it is suggested that the size of the population the planet can sustain depends on the amount of energy sources available. Efficient usage of resources refers to getting things done in the right manner, in minimal time with the minimal cost acquired with no dispersal of resources. So renewable energy is the most important and essential part of a sustainable home. So, it is creating economic development, installation, and more. Energy capability refers to the amount of energy required to provide accurate light. The specific requirements of a lighting system depend on the type of tasks to be accomplished, in a particular space.

Literature Review

Sr. No	Authors	Year	Title	Findings
1	B.Tangwiwant and K. Audomvongseree[1]	2018	Benefits and cost Analysis of the Installation of Rooftop Solar PV with Battery System	In this article we have reviewed about the solar energy from sunlight and discussed about their future trends and aspects.
2	R.K.Kodali[2]	2017	Smart wastewater treatment	This paper reviews the use of wastewater treatment technologies to remove contaminants from wastewater.

A Novel Fuzzy Logic Controller for Power Optimisation of Electric Vehicle Induction Motor

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Abstract: Energy efficiency is crucial in electric cars (EVs) and hybrid EVs since the energy storage is constrained. The induction motor efficiency increases with loss minimization, which is in addition to its excellent stability and inexpensive cost. Additionally, while it is functioning at less than full load, it may use more energy than is actually required to carry out its functions. This paper suggests a fuzzy logic control (FLC)-based control approach for use in electric vehicle applications. The initial current amplitude can be increased with FLC controller, and more electricity is saved. Simulation was used to confirm the effectiveness of this control using the MATLAB/SIMULINK software suite. The simulation techniques exhibit good, high-performance outcomes in time-domain response and swift rejection of system-affected disturbance when compared to the standard proportional integral derivative controller. As a result, the induction motor's core losses are drastically decreased, which raises the driving system's efficiency.

Keywords: Power optimization, Fuzzy logic, Electric vehicle

Introduction

The EV's environmental, technological, and economic potential have sparked the integration of electrical power and transportation networks in ways that were previously unthinkable [1]. The charge of the batteries—the source of power for the EV traction, control, lighting, and air-conditioning system—is the fundamental link between the two sectors. However, charging the EV via the electrical grid places an additional stress on the utility, especially during peak demand periods [2, 3]. Promoting charging from renewable sources is one feasible method for reducing the grid's negative effect. The usage of this type of clean energy is expected to have a positive influence on the environment while also improving the overall charging system efficiency [4, 5].

The effectiveness and cost of the drive are significantly impacted by the choice of the electric machine. But any drive, including those that can be incorporated into EVs and hybrid EVs, must have electric machines [7]. The two major machine types that can be used in EVs are synchronous motors and induction motors (IMs) [8]. The following propulsion should be included in the EV-drive motor [6, 9–11]:

- High efficiency to increase driving distance.
- High torque density to provide sufficient driving force during startup, climbing, and accelerating.
- Good flow regulating ability to broaden the static power speed range.

Because of its strength, low cost, and minimal maintenance requirements, the IM is more frequently used for traction drives and is the best choice for EVs [12–15]. However, because of its increased losses in the EV application [16, 17], the machine efficiency suffers. Low energy density, larger weight, longer charging periods, and longer battery life are the most constraining factors to integrating such cars into the transportation

A Critical and Comparative Review of Load Frequency Control Topologies and Control Techniques

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Abstract
The most complicated systems ever developed by mankind are power systems. There must be numerous control loops present for such systems to function in a stable state. Voltage frequency is a crucial component of power systems that must be carefully managed. In order to do this, main and secondary frequency control loops are used in power systems to regulate the frequency of the voltage. After a disturbance, secondary frequency control, also known as load frequency control (LFC), is in charge of keeping the frequency at a suitable level. The power transfers between various control zones are also governed by LFC strategies. Numerous control strategies have been proposed in recent decades for LFC in power systems. This essay provides a thorough review of the literature on LFC. In this study, the commonly utilized LFC models for various power system topologies are first explored and categorized for both current and foreseeable smart power systems. Additionally, the suggested LFC control mechanisms are examined and divided into several control groups. The research gaps and new research directions in the area of LFC are highlighted in the paper's conclusion.

Keywords: Load frequency control, Distributed energy resources

Introduction

We are aware that since consumer load and industrial load are always changing, a power system's active and reactive power needs are never constant. Therefore, input supply, such as steam input to turbogenerators or water input to hydro generators, must be carefully controlled; otherwise, machine speed might vary, leading to a change in frequency, which is extremely undesirable in the functioning of the power system. Although it is theoretically feasible to achieve zero frequency change, this is not practical. There is therefore a maximum fluctuation in frequency that is allowed. The customer will suffer as a result of larger frequency variations, which might also severely harm the industry's expensive equipment. Today, nature's systems are all interrelated. So any issue with the electricity system is really an issue with many systems. Thus, keeping frequency consistent is a very difficult problem.

Manual regulation is ineffective in a contemporary, vastly networked system, necessitating automated digital control, which has its own set of issues including communication lags. The frequency variances necessitate the creation of a controller that is reliable and, most significantly, simpler in nature. Because of its simplicity, obvious functioning, and usability, PID controllers are still used in more than 90% of sectors. However, many control specialists argued that a PID controller adjusted using traditional methods was not reliable. Advanced control methods such sliding mode control, H-infinity, quantitative feedback theory (QFT), linear matrix inequality (LMI)-based approaches, etc. were thus required. Although it first seemed like these strategies were superior than PID control designs, it has now been shown that these controllers are complicated and have difficulties with resilience in unpredictable environments. The researchers felt there was a need to integrate the ease of PID controllers with optimum tuning methods due to the widespread usage of PID and the shortcomings of optimal

Seismic Analysis Of Reinforced Concrete Buildings In Hilly Topography

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Abstract

The behaviour of a building during earthquakes depends critically on its overall shape, size, geometry and Building site, in addition to how the earthquake forces are carried to the ground. Hence, at the planning stage itself, architects and structural engineers must work together to ensure that the unfavorable features are avoided and a good building configuration & site condition is chosen. In some parts of world, hilly area is more prone to seismic activity; e.g. northeast region of India. Most of the northern hilly region of India lies in the seismically active belt of the Himalayan range. Three major earthquakes (M>8) Kangra (1905), Bihar-Nepal (1934) and Assam (1950) have occurred in this hilly track during the last century and it may repeat. Analysis and comparative study of buildings on sloping ground considering seismic forces with different seismic zones III & zone IV is carried in this paper. The software used for the analysis in present study is SAP 2000v14.0 Advanced. In the present study, 56 RC buildings with different no. of storey ranging from 4 to 10 storey (13.5m to 31.5m height) resting on sloping ground and plane ground are considered for linear static & dynamic analysis. The work has been divided into two phase and each phase consists of four groups of buildings and in each group, 7 numbers of buildings are considered. In 1st group, buildings are resting on plane ground & in 2nd, 3rd, and 4th group, buildings are resting on sloping ground with angle of slope 23 degree, 27 degree & 31 degrees respectively. In first phase, all 28 numbers of buildings have been analyzed under seismic zone III & in second phase, same 28 numbers of buildings have been analyzed under seismic zone IV. The buildings with equal number of storey have same geometric properties and floor area in both phases. The height and length of buildings in a particular pattern are in multiple of blocks (in vertical & horizontal direction), the size of block is being maintained at 5m x 4m x 3m. The depth of footing below ground level is taken as 1.5m where the hard stratum is available. It is concluded that the performance of buildings on sloping ground during seismic excitation could prove more vulnerable than the building on plane ground. There is increase in the value of shear force as the height of building (No. of Storey) increases by Equivalent Static Analysis (ESA) and Response Spectrum Analysis (RSA) along the slope & across the slope direction.

Key Word: Seismic analysis, Sloping ground, Equivalent Static Analysis (ESA), Response Spectrum Analysis (RSA).

A Comprehensive Review on Performance Improvement of Diesel and Biodiesel fueled CI Engines using Additives

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Abstract

Due to rising demand and prices of fossil fuels and their adverse impacts on health and environment, research is now conducted on alternative fuels. Biodiesel is an alternative fuel derived from various edible and non-edible feedstocks. It is utilized as either purely biodiesel or as part of a diesel mixture. However, it has a few disadvantages such as inferior cold flow properties leading to poor cold starting, lower combustion quality, and higher nitrogen oxide emission. These drawbacks can be overcome by using fuel additives. Additives that can be used are metallic, antioxidant, oxygenated, carbon based, organic, or a combination of these. Recent research demonstrated that use of additives improves thermal and physical properties of fuel, enhances combustion characteristics (flame temperature, heat transfer rate, and ignition delay), and increases emission performance. The research available are vast, uncategorized and to some extent inconsistent. Recent research on nano sized particles used as additives for diesel and biodiesel fuel in CI engines is summarized in this article. The future scope underlines the necessity of an environment friendly and economically feasible nano particle additive for CI engines.

1. Introduction

According to a report by the United States Energy Information Administration (EIA), non-OECD Asia countries, primarily China and India, consume the greatest share of energy due to strong economic growth, rapid population growth, and improved access to the energy market. Energy consumption in non-OECD countries is expected to rise by nearly 70% between 2018 and 2050 [1]. Crude oils, such as petrol and diesel, are the most common energy sources. Since the 1970s, there have been increasing worries about crude oil price swings and environmental consequences. Vegetable oils, bioethanol, and biodiesel fuels have recently emerged as viable alternatives to traditional fuels. Biodiesel fuels are increasingly being used in transportation and power generation around the world [2]. India has traditionally relied significantly on crude oil, coal, and natural gas imports, depleting its foreign exchange reserves and increasing fuel carbon imports. By 2030, India's New Biofuel Policy 2018 has set a target of mixing 20% ethanol with gasoline and 5% biodiesel with diesel. The goal will be met through increasing biofuel production, utilizing a variety of non-edible feedstocks, and promoting biofuel blending in transportation, stationary, and portable uses [3].

Commercially, biodiesel-diesel blended fuels can be used in a diesel engine up to 20% (B20) without engine modification. A few advantages of biodiesel fuel are combustion characteristics and physical properties like diesel, but it offers less CO2, HC, and PM emissions. Disadvantages of biodiesel are high viscosity, high density, cold flow properties, a lower heating value, higher specific fuel consumption, and higher NOx emission. Chemical additives must be introduced to improve these properties if a higher blending ratio is to be used [4]. Additives such as cold flow properties improver, antioxidants, cetane number improvers, etc. are added in different proportions in different biodiesels or biodiesel blends with diesel. The results indicate that fuel additives can decrease the emissions and improve the fuel economy [5-7]. With these facts in mind, this paper seeks to outline the major scientific work on the performance characteristics of CI engines running on diesel and/or biodiesel with additives.

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CdSe quantum dot/white graphene hexagonal porous boron nitride sheet (h-PBNs) heterostructure photocatalyst for solar driven H_2 production †

Check for updates

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Abstract

In the world of photocatalytic hydrogen (H_2) evolution two-dimensional (2D) nanomaterials have attracted widespread attention owing to their high surface area, abundant active sites, and excellent photogenerated charge separation properties. In the present work, CdSe QDs coupled with different weight percent of ultra-thin layered hexagonal porous boron nitride sheets (h-PBNs) functionalized with 3-mercaptopropionic acid (3-MPA) have been synthesized and studied for photocatalytic hydrogen (H_2) evolution reaction. The h-PBNs/CdSe heterostructure with 30 wt% optimized loading shows an excellent photocatalytic H_2 evolution of 25 128 µmol g^{-1} h^{-1} which is 18.6 times higher than that offered by solely functionalized h-PBNs. The remarkable photocatalytic H_2 evolution benefits are anticipated to be attained owing to factors like the high specific surface area of porous h-PBNs (409 m^2 g^{-1}), which allows a uniform deposition of CdSe QDs on the surface providing more adsorption sites, and the presence of the thiol group on 3-MPA which strongly tethers the CdSe QDs to the h-PBNs which effectively reduces the photogenerated charge recombination as confirmed by PL and EIS studies. The 30% h-PBNs/CdSe photoelectrode shows excellent photoelectrochemical (PEC) performance. The photocurrent density achieved by

Solution-processed CIGS thin film solar cell by controlled selenization process

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Abstract

$Cu(In,Ga)Se_2$ (CIGS) is a prevalent material with superior thermo-chemical stability and excellent optoelectronic properties for solar cell applications. In thin film form, CIGS could be a potentially economical and building integrated photovoltaic adaptable substitute to Silicon solar cells, solving humanity's extensive energy demands. To be economically sustainable, CIGS thin film processing must be abridged and affordable. We explored a low-cost, simplified wet chemical nano-ink method to make the CIGS thin film absorber layer comprising precursor thin film preparation by spraying CIGS nano-ink and subsequent post-treatment using Selenium vapor under Nitrogen atmosphere at a temperature of 550°C. The spray-casted nanocrystalline layers were selenized at a low pressure of 1 Torr or 1 atm Nitrogen utilizing elemental pallets of Selenium as a source of Se vapor. The impact of Selenization pressure on the structure, morphology, composition, and electronic conductivity of selenized CIGS thin films absorber is investigated in this study, as well as the device performance associated with the processing parameters.

Introduction

Thin film solar cells (TFSC) are anticipated to play a substantial role in fulfilling the emergent electricity demand and reducing carbon footprint worldwide. $Cu(In,Ga)Se_2$ (CIGS) is a capable absorber material with superior thermo-chemical stability and excellent optoelectronic properties for TFSC application [1], [2]. In thin film form, CIGS could be a potentially economical and building integrated photovoltaic adaptable substitute to Silicon solar cells, solving humanity's extensive energy demands. Despite the outstanding performance, CIGS solar cell technology's commercialization has been hindered due to various processing issues related to the absorber layer's fabrication, such as toxicity, complex selenization, poor scalability, and poor material utilization. To be economically sustainable, CIGS thin film processing must be abridged and affordable. We explored a low-cost, simplified wet chemical nano-ink

Review on nanoporous inorganic desiccant materials in the context of application in rotary dehumidifiers

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Abstract

Desiccants play a major role in dehumidifiers operated using desiccant wheels. Performance improvement of desiccant wheels is mostly depending on the desiccants. Good desiccant materials should have high adsorption capacity and low regeneration temperature. Researchers in the past have made several attempts to review desiccant materials that possess good adsorption capacities and low regeneration temperature but not many have reviewed the class of nanoporous inorganic desiccant materials. This class of desiccants covers three novel types – Aluminosilicate zeolites, Aluminophosphate-based molecular sieves, and Aerogels. Detail review of nanoporous inorganic desiccants is presented in this paper in the context of the applicability of desiccants in the dehumidifiers operated using desiccant wheels. Authors have attempted to cover a work of researchers who have synthesized and utilized this novel class of desiccants for dehumidification. It is important to note that nanoporous inorganic desiccants have high adsorption capacity than conventional desiccants such as Silica-gel, activated carbon, zeolites, etc., and also, it possesses regeneration temperatures in the range of 50 to 90°C which can be easy to achieve using low-grade energy or waste heat.

Introduction

VCR (Vapor Compression Refrigeration) system is the most efficient process of air conditioning, which uses liquid refrigerant in the closed loop. Compression – Condensation – Expansion – Evaporation are the basic processes carried out in the typical VCR system. Dehumidification is possible in VCR system only by reducing the temperature of the surrounding air below to its Dew point temperature. Well, we are aware that the VCR system consumes high-grade

Role Of Renewable Energy Development In Economic Growth: Indian Perspective

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ABSTRACT

With the rising concern towards climate change, developing countries are moving towards Renewable Energy sources. By promoting the use of renewable energy, we can enhance the sustainable environment for livelihood and assist in economic growth. This paper focuses on the role of renewable energy in the economic growth of India. It focuses on the government policy framework for renewable energy development and its reflections on the increase in the economic growth of the country.

Keywords: Renewable Energy; Economic Growth; Wind Energy; Solar Energy.

1. INTRODUCTION

India is one of the fastest-growing economies in the world. It follows the institutional framework for fulfilling the needs of energy by which it entices new investment in the energy sector. Fig. 1 illustrates the total energy supply in versus years for different sources like Coal, Natural Gas, Biofuels, etc. The government of India targets to have 175 GW of installed capacity by 2022.During the UN's Climate Summit, PM Narendra Modi Ji declared a neoteric aim of RE (Renewable Energy) capacity 450 GW. For consistent success in the development of RE's, it is required that the following activities like a connection of grid, auction procedures, grid interconnection, and operation of DISCOMs should be executed properly. [1]
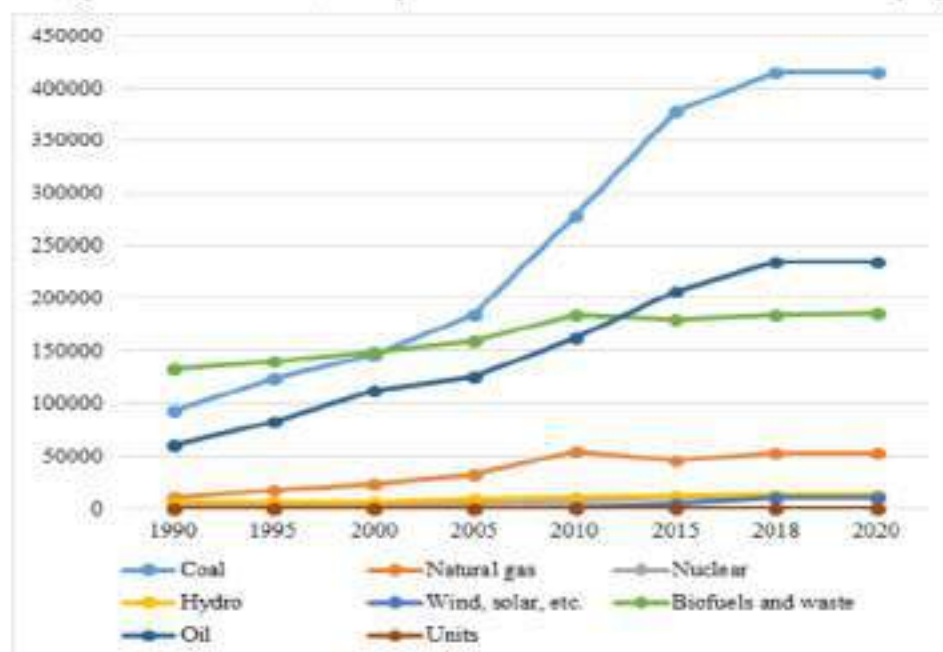
Fig. 1 Total Energy Supply by Source in India [Source: IEA]

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Photo-enhanced field-emission behavior of CdSSe microflowers

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In this work, we synthesized well-grown cadmium sulfoselenide (CdSSe) microflowers on gold-coated silicon substrate using a simple and low-cost chemical bath deposition technique. The deposited CdSSe film was annealed in a furnace for 30 min at 250°C.

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RESEARCH

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Social distancing using IoT approach

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Abstract

In the coronavirus outbreak pandemic by COVID-19, the World Health Organization (WHO) has been issuing several guidelines through all government agencies. In line with those guidelines, social distancing in the population has been a major prevention practice, compelled by all government agencies worldwide. Despite strong recommendations to maintain at least one-and-a-half-meter distance between the persons, the guideline is not scrupulously followed. To overcome this situation, an IoT-based technical solution is proposed through this paper. PIR sensor is used for the detection of a target in the vicinity (1.5 m). Upon violation of social distancing norms, the system will trigger an audio alarm after the detection of the target object. The research paper model is prepared by considering the needs of the people. Many researchers are focusing on tracking affected persons, but few are focusing on the social distancing preventive. The suggested portable device will always notify the person who is violating the norm of 1.5 m. The proposed device will minimize the possibility of transmission and reduce the infection rate of COVID-19. The device uses a PIR sensor depending upon the applicability area of the human being.

Keywords: COVID-19, WHO, Social distancing, IoT, PIR, Etc

Introduction

COVID-19 (Coronavirus disease 2019) is an infectious disease caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). It was identified in December 2019 in China. It was declared a pandemic by WHO. COVID-19's doubling rate is on average 7.4 days [1]. The spread of COVID-19 is due to the transmission of coronavirus [2]. Coronavirus enters the human body through openings like the mouth, nose, and eyes. The droplets exerted through sneezing, coughing, and sometimes talking can spread the coronaviruses from person to person [2, 3].

To reduce the rate of COVID-19 transmissions, many government medical bodies and WHO have suggested some preventive measures through the guidelines. One of the important guidelines suggested by WHO to reduce transmission is social distancing. Social distancing indicates maintaining the distance between two persons. It is strongly recommended by WHO that a minimum distance of 1.5 m must be maintained to reduce COVID-19 transmission [4–7].

The proposed methodology in this paper is used to maintain a social distance of 1.5 m in the vicinity. Various approaches were suggested by the researchers. Researchers used the CCTV cameras [8] either at a public place or through the surveillance system

Drought identification and analysis of precipitation trends in Beed District, Maharashtra

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Abstract

Drought is a complex natural hazard with slow-onset and can occur over months or even years. Typically, a drought index is used to quantify the effect of drought which is based on various meteorological parameters, most importantly precipitation. However, the changing pattern of the rainfall is now a concerning issue and therefore, trend analysis of the precipitation data has become a vital part of the study, as it gives important information of the possibility of changes before prediction and analysis of natural hazards like drought. In the present study, spatial and temporal assessment of meteorological drought has been carried out for the Beed district of the Marathwada region, which is known as a drought-prone area in Maharashtra state. Initially, trend analysis of 34 years of precipitation data has been carried out using non-parametric tests Man-Kendall and Sen's slope estimator. The beginning and end of the trend is determined using sequential Mann-Kendall test. Then, standardized precipitation index (SPI) values of different timescales (1, 3, 6, 9, and 12-monthly) were used to identify and analyze the drought events. The evaluation of the spatial distribution of the SPI over the region has been carried out using GIS. The results of trend analysis revealed that the East and West Beed region station shows non-significant decreasing trends while Central Beed shows a non-significant increasing trend for the monsoon season (June to September). The study has identified a total of six drought events (1985–86, 1987–88, 1992–93, 2001–02, 2005–06, and 2011–12) from 1979 to 2013. The results of the study show that Jamkhed, Ashti, Majalgaon, and Ambejogai are the most affected areas, whereas, Georai and Beed are the least affected during the drought events. The findings of present study will be helpful to gain a better understanding of the drought situation through in-depth trend analysis of precipitation, and assisting policymakers in developing a drought management plan to address the water related crisis.

Introduction

CYCLES FOR AIR CONDITIONING SYSTEMS OPERATED USING ROTARY DESICCANT WHEELS

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Abstract
    The desiccant rotor is one of the proven techniques that can be used for air conditioning either alone or with a Vapor compression refrigeration system in a hybrid manner. The use of desiccant rotors can reduce the consumption of electrical energy in the system by a considerable amount. Desiccant rotors use solid desiccant materials which adsorb the moisture from the incoming air and are regenerated using waste heat or solar energy. Desiccant rotors along with the sensible heat exchanger, cooling unit, and heating unit can be used for air conditioning. In modern practice, all these components can be arranged in a such way that their performance can be optimized according to use in different climates and tropical situations. In this paper, operating cycles that explain the arrangement of these components were discussed in detail. Modifications done to increase the coefficient of performance of the system are discussed. Cycles that are discussed in detail here are the Pennington cycle, Modified Pennington cycle, Dunkle cycle, SENS cycle and DINC cycle. Pennington cycle is economically feasible and less in maintenance compared to others. The most efficient cycle amongst all is SENS but the complex arrangement and very high maintenance compared to others is the main hurdle in its applicability. Some quality experimentation and numerical investigations in this area are expected to happen in near future.

Keywords: Desiccant, Air conditioning, Adsorption, Cooling Cycles.

1   Introduction

    Global climate change is the main problem that we are fighting today. Energy consumption has been increased remarkably in recent years. There could be many reasons possible for an increase in energy consumption but one of the primary reasons is the dependency of electricity generation on conventional non-renewable sources. we are well aware today, that fossil fuel sources are on the verge of depletion. Refrigeration and air conditioning systems are based on a conventional vapor compression refrigeration system in which most of the energy is utilized by a compressor. A large amount of high-grade energy is consumed in the compressor. The amount of high-grade energy utilized in the compressor is directly proportional to the load on the RAC system. When an AC has to handle the moisture removal process, then it is solely depending on the method in which the temperature of supply air is reduced well below its DPT to assure moisture removal from the air, and again it is passed through the heating system to bring the temperature as per human comfort requirement. Here, electrical energy is consumed in both compressors as well as in the heating system. A desiccant dehumidifier is a new way to remove moisture from the supply air. It helps to resolve environmental and economic issues that result from the use of conventional VCRS. It can be coupled with VCRS for human comfort applications as well. The solid desiccant cooling system attracts more and more attention of researchers as it operates on low-grade energy like solar, waste heat, etc.(Misha et al., 2012).

    An increase in temperature of air on the earth surface is observed which is around 75 °C. Rate of increase in CO_2 emission, which is one of the major greenhouse gases (GHG) on the earth is in the highlight. On the virtue of the need for reduction in GHG gases and Global climate change, many government organizations were promoting researchers to solve the issues related to the same. CO_2 alone holding around half of the share in the GHG quantity. Around 40% of energy consumption out of the total energy is consumed in the buildings that does come from the primary sources of energy. Out of the total energy consumed in the buildings, 50% of energy is consumed by Heating, Ventilation, and Air-conditioning (HVAC) apparatus. In 1987, Some of the developed countries were come together against the GHG gas emissions in Kyoto, Japan and decided that they will reduce their GHG emissions by a collective average of 12.5% compared to their 1990 levels. Consumption of less electrical energy or more installation and use of renewable energy can decrease the consumption of fossil fuels. Reduction in CO emission and GHG emission is possible by just using less potential of Fossil fuels. Maximum use of Renewable energy and low-grade energy utilization are effective methods for controlling CO, GHG emissions. However, many countries are still didn't realized this solution. With the increase in the comfort requirement of an individual, HVAC systems are growing so rapidly and gaining ultimate importance in domestic and corporate sector buildings. Researchers have started researching Some novel cooling systems which can be powered using renewable (low-grade) energy sources. The desiccant rotor is one of the proven techniques that can be used for air conditioning either alone or with a Vapor compression refrigeration system in a hybrid manner. The use of desiccant rotors can reduce the consumption of electrical energy in the system by a considerable amount. (Nottingham & User, 2008). The use of desiccant wheels alone for air conditioning would not be a feasible option as thermal performance is very less. The modern principle of air conditioning using desiccant wheels is discussed in

Design and Analysis of Solar Water Purification System

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Abstract - *Pure and clean drinkable water is an urgent need, Often water sources does contain harmful bacteria's therefore they cannot be used for drinking purpose. Pure and clean water is also required in some industries, hospitals, labs and schools. To decontaminate the water a distillation is one the process that can be used for purification of water. For that process heat energy is required and it can be obtained from solar radiation. In this process, water is heated and get evaporated, due to density difference water becomes vapour and foreign particle removes from it and then it is condensed in condensing chamber/solar still as a result we get highly pure water by using a solar still coupled with "parabolic trough solar collector". It was observed that the amount of purified or distilled water from the solar still coupled with "parabolic trough solar collector" as compare to a typical solar still.*

Key Words: condensation, evaporation, distillation, solar radiation, parabolic trough solar collector etc…

1. INTRODUCTION

It is best known that sun is the sole most reliable supply of energy where bright light and heat emitting from it, is being harnessed by humans since the past using a variety of ever evolving technologies and practices. Such practices might include the removal of undesirable chemicals, substance, materials and biological contaminants from water, which is known as the decontamination of water. Most of the water is impure for human application specially for drinking however water purification process may also be designed for a various purposes, such as medical, pharmaceutical, labs and industrial applications. There are various purification process for water treatment like filtration, chlorination, distillation, boiling etc. Distillation is one of the processes for water purification, and sun radiation is one amongst many forms of heat which can be used to power that method. Sun radiation has the advantage of zero fuel cost and it is free from emission. Water purification involves removing various waterborne pathogens (disease which carries organisms) the sun provides key elements that destroy the pathogens. Solar water purification system is one of the system which can used for purification of water. It works on the principle of evaporation and condensation this is also called as distillation with additional use of parabolic trough solar collector it is a combination of two water purification process, solar water disinfection system (SODIS) and the solar distillation process. This purification process involves

purifying water for household and drinking purposes, by using solar energy for water purification now a days become more common as it is usually a low-cost technology solution that captures the heat energy from the sun to create water cleaner and safer for human use. This water treatment is particularly benefent for those who lives in rural areas, as they don't have any other forms of infrastructure for water treatment and more important, electricity is also a major concern there. The best thing about the solar water purification system is that it does not require any fuel or electricity it also good for the environment.

2. Methodology

The design methodology of this project includes a design of a thermosyphonic based solar water purification system it consist of two major component one is condensing basin also called as solar still and other one is parabolic trough solar collector. The analysis is carried of condensing basin as well as parabolic trough solar collector. This water purification system is designed for the estimated output of about 4 to 5 liters per day which is sufficient for our requirement.

2.1 Design Calculation

a) Parabola Design
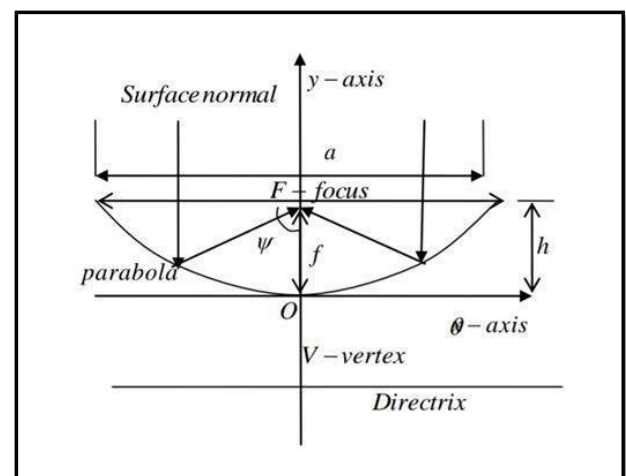
Fig -1: Nomenclature of Parabola [1]

Basically parabola is a conic section, created by the intersection of a right circular conical surface and a plane parallel to a generating straight line of that surface. Another

A REVIEW: STUDIES ON DIFFERENT PERFORMANCE IMPROVEMENT METHODS FOR BATTERY THERMAL MANAGEMENT SYSTEMS FOR LI-ION BATTERY

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Abstract: Every country in the world wants to gain to the title of a developed country rather than a developing or undeveloped country. Without the availability of energy, the objective could not fulfill. This leads to the global issue of environmental pollution due to the excessive use of fossil fuels. The transport sector is the biggest contributor around 24% of direct carbon dioxide emission to the environment after fuel combustion. Concept of electric vehicles (EVs) strongest alternative for internal combustion engines, which may reduce air pollution up to a certain extent. Li-ion batteries gaining popularity due to their numerous advantages like zero-emission, recyclability, good power density in electronic appliances and EVs. Although Li-ion batteries are having positive attribute, it has few limitations of overheating due to excessive heat generation. The Li-ion batteries perform better for the temperature range 15 0C to 40 0C. The operation of batteries below and above the given limits may lead to serious issues like an explosion or short circuit. Therefore it is essential to provide an optimal thermal management system. The paper comprises the effect of temperature on battery performance and battery thermal management systems. Henceforth many of the researchers working extensively on developing an optimized battery thermal management system. Researchers categorized these systems into two basic types i.e. active and passive cooling. Active cooling preferred the use of air and liquid to fulfill the target, while passive cooling utilizes phase change materials (PCM), heat pipes, and nanomaterials. Each of these methods has its limitations and advantages. While choosing a BTMS few factors need to be kept in mind like volumetric constraints, cost of installations, and efficiency of the system.

Index Terms – **Li-ion Battery, BTMS, Electric Vehicles, PCM, Heat Pipe.**

I. INTRODUCTION

The growth within the transportation trade has raised environmental concerns. This combined with the depleting fuel reserves has resulted in varied countries adopting property energy resources to mitigate the upcoming warming crisis. Currently, the transportation industry contributes extremely to global warming and greenhouse gases (GHG) [1]. In step with the recent report revealed by the United States, Environmental Protection Agency GHG emission contribution from the transportation industry was 28% in 2018. To counter the adverse effects of GHG emissions transportation electrification was introduced, because of that the approximate reduction in GHG is according to be 20%. Moreover, if the electricity from renewable sources is employed in electrical vehicles (EV) then it will increase to 40% [2].

Lithium-ion (Li-ion) battery, in comparison with distinctive batteries, is featured through its immoderate strength density [1, 2], prolonged lifespan, and no memory effect. Today, it is been extensively applied in a massive kind of clinical and engineering applications, which incorporates virtual industries, strength storage, military uses, and to name a few. In particular, it is been diagnosed as one of the promising possible strength belongings for future herbal and hybrid electric-powered vehicles. However, Li-ion cells require a selected thermal surrounding to carry out successfully and efficiently. The perfect running temperature variety is from 25 ◦C to 40 ◦C, beyond this variation, the cells begin to overheat and their overall performance reduces at an improved rate. The overheating of the cells also can bring about a thermal runaway; ensuing in protection hazards. Therefore, lately giant studies have been performed for battery thermal control systems (BTMS) [5, 6, 7].

Comparing number of BTM-cooling systems developed from the last few decades, performance of battery at high grab less attention. Within the literature, solely a couple of studies created some attention-grabbing investigations on this subject [8]. So, competent BTM system for Li-ion battery ought to be equipped with each cooling and heating means. It should guarantee battery to be operated at a perfect thermal state, free from any damages and deterioration resulted from either high- or low-temperature conditions. Its value mentioning that the planned style is applicable at an outsized scale with additional batteries included. Though the present results might not be directly climbable for a few specific battery layouts, they're valuable for style

PERFORMANCE ANALYSIS OF PARTICLE SWARM OPTIMIZATION AND DYNAMIC SOURCE ROUTING FOR PACKET ROUTE OPTIMIZATION IN MOBILE AD-HOC NETWORKS

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Abstract: *Efficacy of routing in mobile ad-hoc networks has become a crucial part as a result of the enhanced use of mobile devices and the demand for self-managed networks. Most of the conventional routing protocols have their own limitations in providing secure and cost-effective services. Many researchers have proposed the use of swarm intelligence protocols for routing in MANET however none of the same provide the de-facto solution to issues related dynamic nature of MANET. A novel approach using particle swarm optimization (PSO) to provide a cost-effective solution is proposed in this paper. The experiment is performed using a network simulator tool NS2 and MATLAB. The routing performance of PSO is compared with a commonly used algorithm called dynamic source routing (DSR). This research clearly dictates that PSO is well suited to the dynamic nature of MANET and its performance is superior to DSR.*

***Index Terms* - Ad-hoc network, Particle swarm optimization, Dynamic Source Routing, Quality of Service.**

I. INTRODUCTION

Invent of wireless technology has made our livelihood more progressive and productive. Unlike traditional structured networks, wireless networks don't require conventional media for communication. With the minimum cost of installation, computing nodes are able to communicate with each other in wireless networks. Move over, infrastructure-less networks have laid the foundation of fastest and cost-effective communication. Flexibility is one of the great advantages of the wireless network. To fulfill the needs of temporary scenarios ad-hoc networks are a great demand. Devices like laptops, smartphones, and tablet computers have changed our daily routines greatly

The characteristics of mobile ad-hoc networks make the QoS support a very complex process unlike in traditional networks [1]. First, the nodes in the ad-hoc wireless network have limited power capabilities and they are prone to failure due to the lack of battery power. Dynamic behavior of nodes like low signal quality or node failure leads to changes in topology as well. It may lead to frequent path breaks. Therefore, this research proposes a novel routing protocol using the Particle Swarm Optimization (PSO) algorithm to establish a path in the network that meets QOS requirements by considering the bandwidth conditions prior to the determination of path. The paper starts with the survey of ad-hoc network topologies and a brief discussion of PSO and DSR algorithms. Later, the proposed routing model using PSO and DSR is discussed. The paper concludes with MATLAB simulation results and guidelines for future research.

ANALYSIS OF VEHICLE CHASSIS FRAME MADE OF DIFFERENT COMPOSITE MATERIALS

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Abstract: The chassis frame forms the backbone of a vehicle; its principal performance is to soundly carry the most load for all designed operational conditions. This paper describes the planning and analysis of auto chassis. Weight reduction is currently the most issue within the industry. during this paper, the size of AN existing vehicle chassis frame of a Eicher truck eleven.0 is taken for modeling and analysis of a vehicle chassis frame with 3 completely different composite materials specifically, Carbon/Epoxy, E-glass/Epoxy, and S-glass /Epoxy subjected to identical pressure as that of a steel chassis frame. the planning constraints were stresses and deflections. The 3 completely different composite vehicle chassis frames are sculpturesque by considering C cross-sections. For validation, the planning is finished by applying the vertical masses functioning on the horizontal completely different cross-sections. the software package used for this work is Solid works for modeling, ANSYS workbench for analysis.

Index Terms - **Chassis frame, Composite Material, Carbon/Epoxy, E Glass/Epoxy, S Glass Epoxy, SOLIDWORKS, ANSYS**

I. INTRODUCTION

Chassis could be a French term and used to denote the frame elements or Basic Structure of the vehicle. A vehicle while not a body is termed Chassis. The elements of the vehicle just like the powerhouse, transmission consisting of the clutch gear case, propellor shaft and rear shaft, Wheels, Suspension, and dominant Systems like Braking, steering, etc., and electrical system elements are mounted on the Chassis frame. So, it's conjointly known as a Carrying Unit. Chassis of Automotive helps to stay AN automobile rigid, stiff, and rigid. Automobile chassis ensures less noise, vibrations, and harshness throughout the car. beside the strength, a very important thought within the chassis style is to extend the stiffness (bending and torsion) characteristics. within the standard style procedure, the look is predicated on strength, and stress is then given to extend the stiffness of the chassis, with little thought to the burden of the chassis.

One such style procedure involves the adding of structural cross member to the prevailing chassis to extend its torsion stiffness. As a result, the burden of the chassis will increase. This increase in weight reduces the fuel potency and will increase the value thanks to further material. the look of the Chassis with adequate stiffness and strength is important.

All most all component's weight is engaged on the chassis frame, so the chassis subjected to static, dynamic, and cyclic loading conditions on the road. Static stress analysis is vital to illustrate essential (highest stress) regions within the frame. These essential regions might cause fatigue failures. during this study, a ladder-type chassis frame is analyzed. The Chassis consists of aspect members hooked up with a series of cross members to complete the ladder-like structure, so its name. The FEM could be a common tool for stress analysis. FEM with needed boundary conditions was wont to confirm essential regions within the chassis frame. Static structural analysis is performed to spot essential regions and supported the results obtained style modification has been done.

II. BASIC DETAILS OF CHASSIS FRAME

Model No. = 11.10 (Eicher E2)

Side bar of the chassis are made from "C" Channels with 210mm x 76 mm x 6 mm

Front Overhang (a) = 935 mm

Rear Overhang (c) = 1620 mm

Wheel Base (b) = 3800 mm

Material of the chassis is St 52

E = 2.10 x 105 N/mm^2

Poisson Ratio = 0.31

The Rocker Bogie Mechanism: Design and Fabrication

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Abstract *– The Rocker bogie mechanism is a mechanism primarily used in Mars's rovers to overcome the rough terrains while maintaining stability. The rocker-bogie mechanism is just like a climbing robot-type mechanism. It is NASA's important mechanism for space vehicles & rovers. Rocker bogie has the simplest design and the number of wheels is also less. The model is made to travel the obstacle up to a tilting angle of 35°. This enables to have a suspension-based mechanism that distributes the vehicle load evenly not only on regular but also on bumps and irregular surfaces. The design consists of a spring-free suspension-based differential drive system that allows the bogie to move over rocks, pebbles, and some obstacles. The main gun mechanism adjustment is done with help of a 30 RPM and 60 RPM gear motor and with help of a compressed spring. As the tank's main gun mechanism rotates 360° just like our steel shaft will rotate, so it becomes very easy to throw the ball at any degree angle, and as the project will move on a rough surface like a military tank so it will give military application (Defense Purpose). The main gun mechanism rotates one or more steel sprockets which move a track made up of hundreds of metal links.*

Keywords- Rocker Bogie, Main Gun, Arduino, Relay Driver

I-   INTRODUCTION

We got this idea from NASA, as it is the design developed by NASA in the year 1988; the mechanism was developed for Mars, due to its environment to get more information about Mars. It is the design which is having its all six wheels are in touch with the ground or simply they are in touch with the surface. It is consisting of two arms with a wheel mounted to each. Rocker bogie mechanism is spring-less and stubs axles in each wheel to allow over any obstacles. Rocker means a larger link on each side of the suspension system. Bogie means smaller links that connect to the middle and drive wheel at each end. Basically, it is designed for smooth as well as rough surfaces. This mechanism has all six wheels are touched on the ground equally. The front wheels of the mechanism will be working for overcoming the obstacles coming in their path or route, the middle wheels will be working for getting the rear wheels in work, as the motion will be transferred from front to middle and then rear wheels. The main purpose behind initiations of this mechanism is to grasp mechanical design and the benefits of rocker-bogie suspension system for finding the suitability in conventional loading vehicles to enhance their efficiency and also to down the maintenance cost related to expenses of conventional systems. Here the advancement is done on the upper part of the rocker-bogie that is the main gun mechanism (just like a military tank) the main gun mechanism is throwing a ball with the help of a 30 RPM DC gear motor. The ball is playing the role of ammunition as in the tank. With the help of a controller, it is movable in a

A novel CNN method for the accurate spatial data recovery from digital images

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Abstract

The parsing of floorplans has been an issue for a long time in automated document processing and with algorithmic methods until recent years. This problem has also improved output with the emergence of convolutionary neural networks (CNN). The job here is to obtain spatial and geometrical data from floorplans as accurately as possible. The aim of this project is to extract the most information from a floor plan image around instance segmentation models like Cascade Mask R-CNN. A new style of key point CNN is being implemented to supplement the segmentation to find correct corner positions. Then the resulting segmentation is combined in a post-processing stage. With a mean IoU of 72.7 percent versus 57.5 percent, the resulting segmentation scores surpass the existing baseline of the CubiCasa5k floorplan data base. Moreover, for almost every class, the mean IoU for each class is increased. Cascade Mask R-CNN has also been shown to be better suited to this role than Mask R-CNN.

Introduction

The improvement in machine learning and computer vision in recent years has made computers increasingly more accurate at performing tasks previously seen as unreachable for a computer system to perform. Computer vision

An Efficient Shape Adaptive Techniques for the Digital Image Denoising

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Abstract: The existing state-of-the-art in image denoising is reflected by patch-based approaches such as Block Matching and 3D collaborative filtering (BM3D) algorithms. BM3D, however, still suffers from performance degradation in smooth areas as well as loss of image information, especially in the presence of high noise levels. Integrating shape adaptive techniques with BM3D increases the denoising effect, including the denoted image's visual quality; and retains image information as well. We proposed a system in this study that generates multiple images using different shapes. These images were aggregated for both stages in BM3D at the pixel or patch levels and, when properly aggregated, resulted in an average of 1.15 dB better denoising output than BM3D.

Keywords: Digital Image Processing, Image Restoration, Additive White Gaussian Noise, Image Denoising.

1. Introduction

The field of digital image processing began to develop when it was affiliated with the newspaper industry in the early 1920s. The quality of digital images is one of the biggest issues in this area. Figure (1) shows the first image sent between New York and London, UK, via a submerged cable in the Atlantic Ocean. There is a disturbance in all of the image's grey intensity levels. While the processing of digital images has advanced dramatically since this picture, it still faces many challenges today.

Figure 1: Digital Image produced in 1921 [1]

Either during image processing or transmission or both, the primary source of noise in digital images appears. Relay for image acquisition on imaging sensors sensitive to bright light. The function of the light receptors located within the human eye inside the retina membrane is the same. For example, Charge-coupled (CCD) imaging equipment, which is a type of camera sensor, contains a sensor presented as a 2-D array of several million small solar cells. In this grid, every cell corresponds to a pixel in the digital image. The light from the object is reflected in the grid of the sensor, enabling the solar cells to estimate the projected number of photons in each cell. Finally, each of these calculated charges is converted into a digital pixel value by the analog-to-digital converter (ADC). In more detail, a high photon estimated value, which is converted to a high intensity value, is provided by the cell in the sensor subjected to more light. The pixel will have a value similar to 255 (white) in grey scale images, and vice versa. Logically, to perfectly fit the scene, increasing the number of cells in the sensor improves the resolution and accuracy of the information in the image. However, because of many factors, this is not a hundred percent true.

On the one side, a number of variables, such as light levels and sensor efficiency, are involved in the image acquisition environment. These factors influence the calculation of the final pixel values in the images, causing the appearance of noise and artefacts in the image. On the other hand, image transmission through wired or wireless networks, due to atmospheric conditions or usually flows in the medium of transformation, induces variations in the real pixel values.

Noise is split into two types: dependent and autonomous noise. Like multiplicative noise, based noise de- pends on the pixel value. Although independent noise, including white Gaussian noise, Rayleigh noise, erlang (gamma) noise, exponential noise, and salt-and - pepper noise, is not associated with the pixel strength. By generating an array that is close in size to the image given, different noise models are simulated. Except for salt and pepper noise, the strength values are stochastic numbers with a particular probability density function.

Dealing with noisy images is a much harder issue in real-world applications. Next, the captured images typically involve several models of noise. Images obtained from satellite imagery, for example, include speckle noise, Gaussian noise, and impulse noise. Secondly, it needs prior knowledge of the noise model(s) present in the picture to choose the best denoising method. Finally, assuming that the noise model is understood, several of the existing methods of denoising cause either loss, blurring, disruption in smooth areas or ringing artefacts around the edges in some of the image information.

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Research Article

Implementing a Programmable Drop Voltage Controller Vlsi

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Abstract

This study offers a new synchronized practice area door array (FPGAs), to minimize electricity usage. Concurrent bit-serial architecture is shown in the figure to minimize energy consumption and timing synchronization of switching structures. Researchers offer a fine-grained energy control system with each Look-up database to minimize the Static energy by the channel length, which is now equivalent to the dynamical one (LUT). A 90 nm Processor is the planned field-programmable VLSI. Its electricity consumption is 42 percent lower than that of sequential design.

Keywords: Look Up Table (LUT); Very large scale integration; Field Programmable Gate Array (FPGAS); Level-Encoded 2-Phase Dual-Rail (LEDR)

Introduction

Specially modified circuits are used extensively for application-specific integrated (FPGAs). For small-scale production, FPGAs are expensive since end-users may encode functionalities and interfaces in the logical resource. The FPGAs pose a considerable overhead energy demand to customer silicon counterparts, notwithstanding its competitive advantage in design [1]. The general charge raises the cost of housing and hinders FPGAs' incorporation into smart devices. Asynchronous technology is an effective technique for cheap power, where time management is locally handled. Algorithmic configuration can lead to significant savings by preventing primary and secondary coils problems:

- All parts of a concurrent construction are jumped and performed even if they do not perform a meaningful purpose.

- Each synchronous line is a massive strain that requires large drivers and only driving the clock could expend considerable power.

Such challenges, like digital circuits, are solved synchronously. But the approaches are sophisticated and the difficulties may frequently be circumvented in the case of asynchronous architecture without additional work or flexibility. A contemporary proposal has been made for an asynchronous FPGAs architecture [2]. In the encapsulation of wrapped data is modified to decrease the extra hardware. Such wrapped data encapsulation demands that perhaps the delay be explicitly included in the control algorithm wire so that the request will still

not be received well before combined improved data quantity. Because the proposed method provided is not suitable for unconfirmed VLSI's. Because data programming incorporated is subject to variations in information route duration yet there are significant variances in customizable VLSI's. Several thresholds of the two-track encoding are used by the investigators to provide location architecture to ensure precise operations regardless of pathway size [3].

The whole study proposes the new FPGAs asynchronous design to minimize energy consumption. Due to the complicated switching blocks and the highly programmable number of memories in FPGAs, the power used by switchovers or the clock distributions is dominating the dynamic energy consumption of traditional FPGAs. Asynchronous bit sequential framework is suggested to minimize the power utilization of switching units and clock synchronization. To decrease the LEDR encoding cost, the Bit-serial design lowers changeover block complexity [4].

In addition, the power requirement is influenced by the power dissipation and active as similar as dynamic. The depletion region is more prominent than the transient one in transportable platforms such as mobile smartphones. To decrease static power, we suggest a good power supply, where every Look-Up Table (LUT) contains a huge voltage power button that may be turned off when there is no valid data. With the synchronous application of the finely selected power gate as standard, a large majority of current switches are controlled by considerable energy consumption overhead. The concurrent way involves low overhead as metadata on data arrivals is naturally available.

Architecture

Bit-serial structure with perfect memory management

The FPVLSI is made up of mesh-connected transistors, which can be seen in Figure 1. To decrease the sophistication of the changeover

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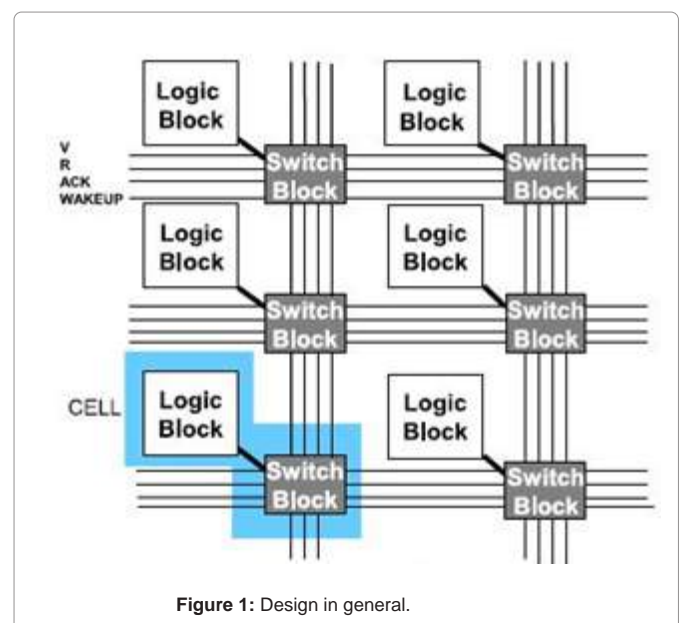
Figure 1: Design in general.

PEROVSKITE SOLAR CELLS AND INTRODUCTION TO METHODS FOR IMPROVING EFFICIENCY, STABILITY, DURABILITY OF PEROVSKITE SOLAR CELLS

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ABSTRACT

Education is at the heart of growth and development of an economy. Currently the world is going through a serious crisis due to this pandemic. There have been disruptions in all walks of life and education is most badly affected, as schools and colleges are closed, students have been confined to their rooms, teachers though working have to find out ways and means to manage their teaching. Online teaching and learning has been in place and has been used in all forms of education including technical. The changed context brought by this pandemic has virtually forced all stake holders including the government to relook at this strategy and understand its strengths and limitations and look at it from a different perspective in the changing scenario. This paper tries to look at e-learning in the general context and the need for adopting this in this new situation, its advantages and limitations to students and teachers, the initiatives taken by govt. bodies and other organizations including the author's institution. Further the issues that are going to impact online learning has been reviewed and emphasizes the need for a formal study about its impact to understand all the issues so that necessary policy decisions can be taken at different levels to make it more meaningful and useful.

Keywords: *Online education, pandemic, students*

1. INTRODUCTION

Nowadays with increasing demand for energy and with fast decrease conventional source of energy such as coal, oil, petroleum, natural gas, etc. are the non-conventional source of energy obtaining importance. This energy is available in large quantities, renewable, pollution free and eco-friendly. Among non-conventional energy sources, solar cell is the best resource to exertion of the solar energy. There are various types of solar cells like amorphous silicon solar cells, concentrated PV cells, perovskite solar cells, etc.

At the present time, perovskite solar cells are fastest approaching solar technology. With the prospect of achieving higher performance, efficiency and very low production costs and they have become commercially attractive. Become apparent and prominent, thin-film PV class is being formed, also called third generation PVs, which refers to PVs using technologies that shows the capacity to

An Improved Approach for Pedestrian Safety in Road Development and Land Use Planning

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ABSTRACT:

This work focuses on the importance of creating safe, accessible, and easily understood installations that prioritize the needs of pedestrians. This includes considerations for road design and land planning, with an emphasis on pedestrian safety advocacy. The research explores how the design of roads and the overall built environment can either prevent pedestrian accidents or increase vulnerability. The section on road safety delves into how inadequate planning can contribute to pedestrian accidents during the construction of sidewalks, and it offers examples of design elements that can enhance pedestrian safety. The study also addresses how land use policies can impact the safety of pedestrians, highlighting strategies to reduce risks associated with land use. The paper discusses policy and planning reforms aimed at promoting pedestrian safety and provides recommendations to enhance pedestrian security. Understanding pedestrian behaviors in mixed traffic scenarios is crucial for maintaining facilities and improving pedestrian safety at designated intersections. The research analyzes pedestrian behaviors at intersections, including walking speeds, compliance with traffic signals, and interactions between pedestrians and vehicles. Factors influencing these behaviors are identified through statistical analyses. To assess crossing behaviors and the impact of various factors on compliance with traffic signals, a survey was conducted with 719 pedestrians at three signalized intersections in Nasik, India. The study calculates average walking speeds for different age groups, with 1.02 m/s for the elderly and 1.40 m/s for adult pedestrians. Logistic regression models are developed to predict the probabilities of pedestrian violations and interactions. This research serves as a valuable resource for both researchers and practitioners, offering insights into pedestrian behavior at designated crossings and improving models for pedestrian safety under various traffic flow conditions.

Keywords: Pedestrian Safety: Analysing Crossing Speed, Vehicle Interaction, Walkways

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1. INTRODUCTION

Historically, road traffic analysis has primarily focused on the study of vehicular movements. Pedestrian considerations have often taken a backseat in road design, with a greater emphasis on safety, convenience, and comfort for motorized vehicles. One of the primary reasons for this trend is the complexity associated with modeling pedestrian behavior. This complexity arises from various factors that influence pedestrian crossing behaviors and actions, making them challenging to categorize.

One crucial parameter in designing signalized intersections, particularly in the field of traffic engineering, is the pedestrian crossing speed. It has been observed that pedestrian

In India's Urban Planning: Uncovering Challenges and Solutions for Indian Cities

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Abstract

The concept of "smart cities" is gaining global traction, often described as "enhanced," "interactive," or "inclusive" urban areas. It represents the latest in a series of tech-driven urban initiatives aimed at enhancing local governance and fostering economic growth. These initiatives encompass a range of programs, from implementing intelligent water meters in every household to establishing citywide Wi-Fi networks. Any element that leverages information, data, and communication technology to enhance a city's efficiency and accessibility falls under the umbrella of "smart city" components. In this article, we will explore the initiatives taken by the Indian government and shed light on the numerous challenges faced by smart cities.

Keywords: Smart cities, Urban Planning, Indian Governance, Planning

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1. Overview

This research underscores the growing importance of urbanization in India and the relevance of smart city development in the present era. In 2011, the urbanization rate stood at 30%, but statistics project that by 2030, this rate will rise to 41%, indicating a rapid acceleration of urbanization. Comparatively, India's investment in urban infrastructure is modest, with a per capita spending of $17 per year, while in many other economies, this figure often hovers around $100 per year. This disparity highlights the relatively low allocation of resources by the Indian government for urban development, which, in turn, affects the quality of urban planning.

Constructing a physical model using MIVAN technology including the evaluation and estimation of building

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ABSTRACT:

One of the important economic sectors in India is construction, which is essential to growth. India has the second-largest urban population in the world today, and as the country develops further, the demand for housing will rise. In order to address this issue, India will urgently need to make plans for the purchase of land and the quick construction of housing units. Since formwork makes up between 35 and 40 percent of the entire project cost of the structure, it is one of the most significant variables in determining the success of a construction project in terms of speed, quality, cost, and safety of work. Both the client and the contractor strive for an early completion of a construction project since the client wants to use the facility for its intended use as soon as possible. In order to increase profits, the contractor wants to complete the project as soon as feasible. A very short floor cycle is the most effective approach to expedite the work in mass house building. As the primary determinant of project duration, the formwork type has a major impact on a building's floor cycle.

Using physical modeling of the G+1 Building, this study aims to showcase the aluminum formwork technology utilized for high-rise construction and demonstrate how each will affect the project length, project cost, aluminum formwork feasibility, and work quality. For the G+1 Building, we have completed the cost estimation for both conventional and MIVAN technologies. For the G+1 Building, we have also compared the costs of MIVAN and conventional technologies.After that, AutoCAD was used to prepare a 3D model. Prior to doing any physical modeling, we conducted a market study in order to analyze the cost of the physical model. We then employed an alternative shuttering to prepare the physical model because the high cost of aluminum a shuttering for small models was prohibitive.   First, we prepared the shuttering in the workshop for modeling. After that, we arranged the shuttering appropriately and cast the G+1 Building's base and ground level.

Keywords: Formwork, MIVAN, Technology, Conventional

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1.   INTRODUCTION

In addition to clothing and food, shelter is a basic human necessity. India has been able to feed and clothe its enormous population, but it is unable to find answers for the issue of housing everyone.

"The overall number of housing units has grown significantly, from 65 million in 1947 to 187.05 million in 2001, although there is still a significant discrepancy between supply and demand. In 2001, the Housing Working Group for the 9th Five-Year

Study of Existing Water Treatment Plant and Expansion for Future Growth at MIDC, Avdhan, Dhule

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ABSTRACT

Nowdays water shortage is the consuming issue. As it is very clear that there is everyday expansion in populace, the interest for water likewise increments to fulfill the requirements of the local area there comes a need to upgrade the current treatment plants, or plan the new treatment plants. Overhaul or configuration incorporates pressure driven plan and cycle of treatment of water in the plant. By and large water can be treated in treatment plants for eliminating destructive substances present in it. The treatment interaction incorporates pretreatment, air circulation, coagulation, flocculation, sedimentation, filtration, fluoridation, molding and sanitization.

Aim of study was to design the water treatment plant for MIDC, Avadhan, Dhule. The source of water is Akkalpada Dam. The properties of water changes in light of its surface source. In this manner there is a ton of significance to plan treatment plant to MIDC, Avadhan, Dhule. Tests performed are physical, chemical and biological test to check the nature of water provided by the water treatment plant.

This Project incorporates the detail of the treatment units present in the current water treatment plant at MIDC, which are 9 altogether, and anticipating the rising interest of water. This venture includes all the plan estimations for the new treatment plant and furthermore the plan rules on which these have been planned.

The venture includes the new proposed site called as Raver which is situated in encompassing area of Avadhan MIDC. The proposed development is conceivable and can be handily finished. Generally speaking the fundamental reason for this task is to help and propose another plan to the MIDC so the future necessities of the rising ventures can be met, and every one of the enterprises can successfully utilize this water.

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Green Building: A Holistic Overview of Cost Effective Housing

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Abstract-

The history of the development of ancient Greek cities demonstrates the adoption of passive solar design, which allowed for the wintertime recovery of solar heat in all of the homes. The first experiments with the modern green construction concept were conducted in recent years as a result of the rise in oil costs in the 1970s and the environmental movement. The construction industry in India, which contributes around 7% of the country's GDP growth and is the second-largest sector after agriculture, is expected to develop at a pace of about 9.2%, as opposed to the global average of 5.5%. This industry uses roughly half of the key resources in the world and 40% of all the energy. Thus, it is important to address seriously the issue of energy security and green building efforts. For a successful cost-effective housing as green building project in Pune, this project researches the various green building technologies and rates them. In new structures created using green building principles, there is a possibility for energy savings of 40–50%, whereas retrofitting existing buildings can result in energy reductions of up to 20–25%. The additional cost compared to normal construction is approximately 5-8%, with a payback period of 2-4 years. In order to save the environment and maintain life, the study highlights the significance and advantages of green buildings.

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Introduction

Green building is the practice of designing and constructing buildings using resource- and environmentally-conscious methods at every stage of their lives, from planning to design to construction to operation to maintenance to renovation to deconstruction. It is also referred to as green construction or sustainable building.

These structures are known as "green" buildings because they resemble trees, which only produce food through the use of sunlight and air. Like trees, these structures can produce energy and utilize it effectively without harming the environment. Natural resources are used as little as possible during the construction and maintenance of a green building. A green building's design seeks to use as little resources as possible in both construction and maintenance. The goal of a green building design is to reduce the demand for non-renewable resources, increase the efficiency of these resources' use while they

are in use, and increase the use of renewable resources through reuse, recycling, and other green building practices.It uses the most energy-efficient equipment to meet its lighting, air-conditioning, and other needs, the most energy-efficient building materials and construction techniques, the most on-site sources and sinks through bio-inspired architectural practices, the least amount of energy to power itself, the most renewable energy sources, the least amount of energy to power itself, the most effective waste and water management techniques, and the most comfortable and hygienic indoor environments.

Massive amounts of trash are produced as a result of development through industrialization, urbanization, and infrastructure facilities, which poses a severe environmental threat. Due to rapid urbanization and industrialization, conventional resources are running out, and parking is becoming more challenging. The

An overview of Bearing Capacity of Foundation

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Abstract
Any structure's foundation is its most crucial component. The foundation of the building must be appropriately designed because it bears the weight of the entire structure. Two of the design's main considerations are footing settlement and the bearing capability of the soil beneath. Determining the soil's carrying capacity and footing settlement has been a long-term project with a lot of work. This study examines the research completed thus far on these
Keywords: settlement, Bearing capacity, footing

INTRODUCTION

The ultimate carrying capacity of the soil beneath the foundation and the acceptable settlement that the footing can experience without compromising the superstructure are the two separate components of foundation design. The ultimate bearing capacity measures the weight that the soil beneath the foundation can support before shear failure; on the other hand, the superstructure's settlement should be calculated within the bounds of permitted deformation for structural stability, functionality, and other factors. Analytical solutions or experimental studies might be used to conduct research on the ultimate bearing capacity issues. The former can be investigated using finite element analysis or the theory of plasticity, whereas the latter can only be accomplished by carrying out full-scale, prototype, and model experiments.Only when theoretical and experimental data match can a good solution be discovered. According to a review of the literature, most bearing capacity theories assume uniform soils beneath the foundations. Because the bearing capacity study relied on the assumption that the qualities of the soil would remain constant, analytical solutions such as Terzaghi's bearing capacity theory matched the experimental findings. Nevertheless, the majority of these theories cannot be applied in situations where the properties of the soil change with depth, and the analytical solutions that account for the non-homogeneity of the soils are approximations, leading to inaccurate conclusions.

REVIEW OF PREVIOUS WORK

The procedure of determining the soil's carrying capacity has been drawn out since ancient times and has involved several research projects, both analytical and experimental. This section provides a quick summary of important carrying capacity studies and the contributions made by various researchers.
Prandlt (1920)
In order to determine the maximum bearing capacity, Prandtl 1920 created an equation based on his research on the penetration of long, hard metal punchers into softer materials. Accordig to his study, The soil is softer, homogeneous and isotropic, weightless and possesses only friction and cohesion. He developed equation assuming two dimensional condition.

$$.q_f = C \cos\phi (N_{\phi.}\, e^{\pi tan\phi} - 1)$$

Newmark (1935)
Developed To calculate the vertical stress increase caused by distributed horizontal shearing forces applied at the surface in the interior of a semi-infinite homogeneous isotropic elastic mass, an effect chart is provided.
Westergaurd (1938)
According to Westergaard, an elastic soil is laterally reinforced by many horizontal sheets that are tightly spaced apart, barely thick, and infinitely rigid. These sheets only permit vertical movement and prohibit any lateral strain on the mass as a whole.
Terzaghi (1943)
According to Terzaghi's theory of bearing capacity, the overburden pressure, q (=gD) above the footing, and the shear stresses at the boundaries of three zones under the footing resist column load P. The soil's cohesiveness is indicated by the first term in the equation. The second phrase has to do with

OPTIMIZATION OF AXIAL FLOW COMPRESSOR BLADES USING GENETIC ALGORITHM AND COMPUTATIONAL FLUID DYNAMICS

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ABSTRACT

Optimization of airfoil blade section using evolutionary algorithm coupled with numerical methods of analysis is becoming a trend nowadays. A new MATLAB code is developed to realize the optimization of high pressure ratio axial flow compressor blades using genetic algorithm coupled with the Computation Fluid Dynamics (CFD) package. Use of Bezier-PARSEC parameterization is made to parameterize the base CDA airfoil. MATLAB code successfully integrates and runs the optimization process and optimum results thus obtained shows a good agreement with experimental results.

KEYWORDS: CFD; MATLAB; Bezier-PARSEC Parameterization & CDA

1. AIRFOIL PARAMETERIZATION

Bezier–PARSEC Parameterization [1]

This technique was introduced by Derksen and Rogalsky. An airfoil is represented by of some qualitative aerodynamic and mathematical parameters. PARSEC parameters are used to define airfoil coordinates and Bezier curves join those coordinates.

Bezier Curves [2]

A degree n Bezier curve is defined by n +1 vertex points of a polygon. These vertices are known as control points of the nth order Bezier curve. The general expression for an nth order Bezier curve is as follow.

$$p(u) = \sum_{i=0}^{n} P_i \frac{n!}{i!\,(n-i)!} u^i (1-u)^{n-i}$$

Where Pi =ith control point

The parameter u is dimensionless and ranges between 0 and 1.

The following method is developed to optimize the airfoil making use of parameterization and genetic algorithm coupled with computational fluid dynamics. The method is divided into following steps.

Step 1: The Blade is Split into its Respective Thickness Distribution and Camber Distribution

For this, camber and thickness distribution at the same chord wise position of the blade should be available. A polynomial function is fitted for the given camber line and slope at given camber chord locations are calculated.

OPTIMIZATION OF HIGH PRESSURE RATIO COMPRESSOR BLADE SECTION

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ABSTRACT

Optimization of airfoil shape utilizing developmental calculations is turning into a pattern in plan of cutting edges for turbo machines and flying machine. Transformative calculations work with parameterization of airfoil shape for example portrayal of an airfoil with the assistance of some shape administering parameters. Along these lines one of the difficulties in this field is to portray the airfoil with reasonable parameters and unequivocal or verifiable scientific capacities. In this work, the airfoil cutting edges are effectively improved utilizing hereditary calculation. Airfoil is parameterized utilizing Bezier-PARSEC parameterization plan and same is numerically broke down utilizing Gambit and FLUENT. A base CDA airfoil is improved for different weight proportions running from 1.1 to 2.2. The sharp edge segments so streamlined are tried for low constrain proportion to approve the calculation in low speed course wind burrow. Further the calculation is approved with distributed exploratory information of Rotor37 which approves value of the optimization technique.

KEYWORDS: Compressor Blade, Bezier-PARSEC Parameterization, CDA & Parameterization

1. INTRODUCTION

Optimized blades have been increasing in popularity in the recent times. Turbomachinery blades are optimized based on multi objective function [1][4]. Algos based on principles of genetics for the search of optimum solution are proving to be excellent. These evolutionary algorithms coupled with CFD softwares are potential tools of optimization [2]. The main hurdle in the optimization process of airfoil blades was to define the geometry of airfoil with the help of few controlling parameters [3]. Defining the airfoil blade with few governing parameters is called as parameterization. Various techniques have been developed to carry out the parameterization. Parameterization techniques normally include Bezier parameterization, PARSEC method, Sobeiczky method, B-spline parameterization and Bezier-PARSEC parameterization. Bezier-PARSEC parameterization is found to fit for parameterize a wide range of existing airfoil sand is used in the present work. Once an airfoil is represented with its parameters, these parameters could be changed in the set range so as to obtain a pool of airfoils. Each of the airfoil of this pool can be tested for its performance and the best airfoil which satisfies the objective function could be obtained over the specified number of generations. In the present work a base CDA airfoil is parameterized using Bezier-PARSEC parameterization. A pool of airfoils is generated using genetic algorithm and a numerical study conducted on every airfoil using GAMBIT and FLUENT software.

The stream attributes at transonic velocities are exceptionally touchy to the geometry of the aerofoil. This

AERODYNAMIC DESIGN AND ANALYSIS OF A TRANSONIC AXIAL FLOW COMPRESSOR STAGE

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ABSTRACT

Aerodynamic design of an axial flow compressor for a gas turbine engine utilized in procedure ventures for power generation and steam production. Engine is designed for 500 KW comprising of design of axial flow compressor, annular combustion chamber and axial flow turbine. The cycle considered for the investigation is regenerative cycle having regenerator viability of 0.78. The axial flow compressor is designed for 33006 RPM dependent on Isentropic Radial Equilibrium technique. This is radially consistent weight proportion design with variable proficiency for rotor. All Isentropic Radial Equilibrium Equations are accessible in graphical structure, which are customized through C-program. It figures the speed vector charts at a few axial areas at driving and trailing edges of the cutting edge. This program likewise gives the rate, deviation, harmony and different geometric parameters. Weight proportion, delta all out weight and temperature, total Mach number, rotational speed and rotor tip cutting edge speed are the contributions to this program. Determined span along cutting edge stature, flow points and occurrence edges from the above program are then utilized in the edge generation. The parameters acquired are then additionally utilized for displaying through bladegen for both stator and rotor. This displayed rotor and stator at that point coincided in turbo-framework and investigated through CFX.

From the Mach number forms of the flow through the compressor arrange, it creates the impression that the flow is polite in the rotor, however it is slightly below average in the stator, as showed by the nearness of stun and flow partition. This horrible stator execution is credited to high flow turning through the cutting edge areas. It is proposed that the flow quality can be improved by expanding the stator sharp edge robustness or by joining controlled dispersion aero foil areas or by tandem stator edges.

KEYWORDS- Transonic Compressor & Axial Compressor Design

1. INTRODUCTION

The consistently expanding demand for minimized, lightweight turbojet and turbofan engines for airplane power plants has prompted relentless improvement of transonic fans and compressors. In spite of the fact that, the supersonic compressors offer significantly higher weight proportions per organize, they experience the ill effects of the inconveniences of high stun misfortunes and decreased flow go. Then again, transonic machines offer genuinely high sharp edge loadings at high productivity levels. Understanding its potential, the spearheading research on transonic fan

Developing Public Transport Accessibility Model For Nashik City, Maharashtra, India

Darshankumar Patel

Abstract— Theories of new urbanism and smart growth usually point at accessibility as one of their most significant principles. Researchers have called for a paradigm shift from auto mobility oriented planning towards accessibility oriented planning. In most of Indian cities accessibility criteria is neglected while preparing for transportation plans. Mobility is major factor within urban areas but mobility based approach create sprawls. This resulted into lot of time and money spend on basic travel needs such as shopping or commuting. Accessibility is function of both land use pattern and performance of transportation system. It is particularly appropriate criteria for evaluating service provided by transport system to different categories of users. Movement in cities mainly governs by various purposes like work, education, shopping etc. Among all these trips work are mandatory trips. Study focuses on to access the accessibility for public transportation systems within the Nashik city. To fulfil this aim, first concepts and definitions of accessibility understood along with case studies as a part of literature. After this secondary data is collected and analyzed. It is not possible to understand traffic scenario of Nashik city only by secondary survey. Firstly, gaps are identified and based on the data required questionnaire is design for primary survey. Then primary survey is conducted in Nashik city to understand present travel pattern of city along with issues faced during trip. After that for public transportation accessibility index is calculated and mapped for all zone by trip purposes. Public Transport Accessibility Model (PTAM) is used for evaluating level of accessibility by public transport. Values of PTAM can be used by policy makers for public transport improvement.

Index Terms— Geographic Information System (GIS), Public transport, Workplace accessibility, Public transport Accessibility Model (PTAM), Public Transport Accessibility Level (PTAL), Relative Accessibility Index (RAI), Traffic analysis Zones (TAZ)

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1 INTRODUCTION

Accessibility is an estimation of the spatial dispersion of various activities around a point, balanced for the ability and the desire of individuals or firms to overcome spatial division [1]. Accessibility, an idea utilized as a part of various scientific fields, for example, transport planning, urban planning and geography, assumes an imperative part in policy making [7]. It can be characterized as the closeness of individuals, places, and services to the transportation system [5]. Accessibility refers to individuals' capacity to reach services, goods and activities, which is a definitive objective of most transport activity [11]. The more accessible to various activity area in community lead to greater its development potential [1]. Accessibility is a crucial characteristic for metropolitan regions and is frequently reflected in transportation and land-use planning objectives [4]. Land-use and infrastructure policy plans are frequently assessed with accessibility measures which helpful to policy makers and researchers to solve the problems [7]

Public Transport Accessibility Levels: Ahmedabad study PTAL is calculated by four different methods out of which quintile method is finalized for the PTAL mapping of Ahmedabad City [16]. GIS for Multi-modal accessibility to Jobs for the Urban Poor: Ahmedabad study links the urban poor, jobs and physical infrastructure with help of GIS modelling. This study shows that local planning effort should concentrate on public transport improvement, the NMT feeder function as well as integrated urban land use and transport development strategies, acknowledging the home and job locations of the urban poor [13]. Geographic accessibility analysis and evaluation of potential changes to the public transportation system: Milan, Italy study, potential changes to the surface public transportation system in the City of Milan are evaluated. Surface public transportation system can be considered unattractive because of its lack of

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efficiency. This case study also helpful for finding out the potential zones for the improvement of public transport system not only for citizens but also for business area within the city limit [14]. Measuring Local Accessibility by Public Transport: Krefeld, Germany study aims to enhancement of accessibility indicators to be used in public transport plans. In traditional public transport plans planners mainly examine the transport system itself and its own quality of development and connectivity. This study presented a proposal to use a travel time budget indicator for analyzing local accessibility by public transport. By using the developed GIS application, the method was exemplarily demonstrated for a planned project in the case study city Krefeld [8].

In various researches, workplace accessibility is also referred as job accessibility. Workplace accessibility measures might be influenced by transportation implies, transportation means, congestion, road network, and force of competition for employments among workers [6]. The study by Wang and Fahui (2003) reveals that job access is the spatial issue [6]. The poor workplace accessibility in inner city area has intense impacts in the residents [6]. The lack of employment level has severe impact on city ranging from criminal behavior, social disorder [3]. The reason behind it, might be socioeconomic factors including vehicle ownership [2].

Amsterdam Job Accessibility Measure study shows that, job accessibility can be measure and mapped in GIS environment. For this purpose, data related to transportation network and location activity is essential. This case study also gives an idea about diversity of job opportunity and its mapping. This information can be used for formulation of various Policies [12]. Public Transport Accessibility Level: London study PTAL is calculated in terms of number. This PTAL value is used in development plan to formulate policy like decision of housing density, Parking area location and Allocation [15]. The accessibility describes the how places are well connected to each other. If the public transport works efficiently then the level of accessibility improves. In this study the main focus is given on work trip because it is mandatory trip and no one can deny this trip. Primary survey conducted in Nashik city indicate that there are five major mode of transport which are bicycle, motor cycle, car, auto rickshaw, bus (public transport). To calculate Relative

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Cultivation and potential application of microalgae in treatment of Pesticide Manufacturing Effluent

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Abstract

Pesticides are used for improving productivity, quality, safety of crops. Large number of pesticides is manufactured, which contaminate environmental matrices due to spillage, disposal, etc of its effluent. Besides number of techniques and methods available for treatment of such type of wastes, each method has its own pros and cons considering its applicability, economy, efficiency, etc. This paper primarily focuses on cultivation of microalgae in natural sunlight and in lab with artificial light source, its potential application in treatment of effluent generated from pesticides manufacturing plant. Study reveals that by comparing different L/D ratios and time period; 16 h L/D ratio yielded maximum growth in 3 days of time period; this combination is chosen to determine and removal of parameters from wastewater. Results obtained showed COD removal of 49.09%; BOD removal of 55.56%; Phosphate removal of 96.06%; 32.47% Ammonia and sodium removal of 37.43% in natural sunlight. Similarly, it was observed that with artificial light source in lab, efficiencies improved and attained 87.42%, 84.44%, 99.97%, 80.99%, 48.38%, and 32.30% for COD, BOD, Phosphate, Ammonia, Sodium and Potassium respectively. It can be concluded that microalgae based treatment scheme can be prudent, friendly to environment and green in treatment of pesticide effluent.

Introduction

With ever increasing population and with limited land source, use of pesticides as method of modern agricultural practices is vital in attaining food security. Pesticides are used to improve quality of product, safety of crops from various attacking elements and are used as germicides, insecticides, fungicides [1], [2], [3], [4], [5], [6]. In attaining the goal, extensive utilization of pesticides is results into manufacturing these compounds in plenty, which ultimately contribute to polluting various environmental matrices due to spilling, storage, manufacturing, application [7], [8], [9],

Low Temperature Combustion with Multiple Injection Strategies in Single Cylinder Diesel Engine

Yogesh Diliprao Sonawane, Ekanath Raghunath Deore

Abstract: Low-temperature combustion(LTC) with multiple injection strategies is a recent trend for NO$_x$ and soot reduction in single-cylinder diesel engines. This paper presents a technical study of past research carried out on multiple injections, which are pilot I and pilot II injection before main injection, to decrease engine soot to meet emission legislation while upholding efficiency and decrease or eliminate exhaust after treatment. Previous research indicates that extending ignition lag to enhance the proper premixing, and controlling temperature of combustion to optimal level using Exhaust Gas Recirculation, have been accepted as an important aspect to attain low temperature combustion. In this paper, we first discuss the effect pilot I injection and pilot II injection strategy through varied injection quantity and time range. Thereafter, we briefly review how pilot II injection provides better results compared with the pilot I injection, which is by reason of better premixing, improves the turbulent effect and lowers the emission. Next, we provide a broad overview of the collected works on the effect of injection pressure, temperature and rate of exhaust gas recirculation on engine emissions. We conclude by identifying a few dependencies of engine parameters in low-temperature combustion by multiple injections so as to reduce the engine emissions.

Keywords: Low-temperature Combustion, Multiple injections, Engine-out emission, Ignition delay, Exhaust Gas Recirculation.

I. INTRODUCTION

Toxic gas emissions need to be reduced to have better competence in the energy system. Mainly the transport sector is focused a lot on the energy system. Hybrid engines, thermal management systems of an engine, biofuels, battery operated cars, and fuel-cells technology are now using to increase the effectiveness of the transport sector. To dodge NO$_x$ plus soot creation zones, there should be proper control on the inner temperature of a cylinder which is the leading constraint for both formations of contaminants and thermal energy[1]. To achieve this, research has led to new combustion technologies such as LTC. It uses various features such as EGR, lean mixtures, high CR, fuel stratification, VVT and diminutive ignition intervals which would provide the best combustion process but it has restrictions caused by HC emissions and high burning sound[2]. Several approaches have been endeavored such as multiple injections, high cetane number, and high volatility fuel and high intake pressure to diminish the combustion noise and the CO and HC emissions[3][4].

In recent periods there are more difficulties to meet the strict rules and regulations without extensive use of after treatment and this can be achieved using HCCI, PCCI, and RCCI. This less amount of engine exhaust emissions are achieved by adequate partial premixing and the great quantity of EGR drops the temperature of combustion.

PPC is a concept where low combustion temperature could be attained by monitoring the injection of fuel and chemical kinetics. This low-temperature combustion concept often used where the ignition delay period is extended in order to improve fuel-air premixing. An increase in ignition lag makes available additional time intended for fuel to penetrate gas blend before the starting of combustion which reduces both the creation of PM and NO$_x$ due to lesser combustion temperatures. It has been observed earlier that PPC with single injection gives rise to the very high amount of pressure upsurge rate as of extended ignition lag, which leads to high audible noise and vibrations and causes mechanical engine damage, therefore it has to be kept minimum as much possible in order to have a smooth operation of an engine. A remedy to the problem is to divide the fuel injection into numerous injection events i.e. multiple injection. In this paper, the main objective is to study multiple injection strategies in LTC and its effects on engine exhaust emissions.

II. METHODOLOGY

Low combustion temperature can be carried out using HCCI, PCCI, and RCCI. Mechanical damages to the engine, less combustion controllability, and high-temperature compassion could occur in the HCCI engine due to the high rate of pressure rise. As shown in Fig. 1 widely accepted strategy is PCCI, which is carried out using multiple injections, EGR, high intake Pressure and high intake temperature. The strategies of multiple injections like the pilot, main and post-injections are being used for lowering the engine-out emissions and smooth operation of diesel engines. This paper highlights the comparative study between both on engine-out emissions.

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Investigation of an Open Graded Asphalt Concrete Overlay for the Mitigation of Reflection Cracking Phenomenon

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 Abstract: The conventional technique of rehabilitating pavement through the application of an asphalt concrete (AC) overlay is often plagued by the issue of reflection cracking. This paper addresses the challenges associated with the reflection of pre-existing distress patterns onto newly laid AC overlays, leading to premature deterioration and a significant reduction in overlay lifespan. Laboratory investigations were conducted using open graded asphalt concrete (OGAC) as a crack relief layer, examining its performance under opening and mixed modes of displacement on Asphalt Concrete Slab Fatigue Testing Equipment. The study included an evaluation of conventional dense bituminous macadam (DBM) overlays and OGAC overlays subjected to simulated thermal as well as traffic loading, further monitoring of tensile strain and strength variation in the asphalt concrete overlay for a specific number of load cycles thermally simulated. Additionally, the cumulative decay parameters such as tensile force and stiffness modulus were computed, and decay parameters were analyzed along with overlay life. The results reveal that the implementation of an OGAC overlay effectively serves as a crack relief layer, offering a potential sustainable solution to mitigate reflection cracking in asphalt pavements.

Keywords: Reflection Cracking, Open Graded Asphalt Concrete, Crack Propagation, Differential Deflection, Base Isolation

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1. Introduction (Times New Roman 10 Bold)

Reflection cracking emerged out as most important challenge in design of pavement. Figure 1 shows the appearance of reflected cracks. It has been noted that in addition to traffic stresses, thermal loads brought on by daily and seasonal temperature variations lead the existing fracture to spread upward through freshly put overlay. Open graded asphalt concrete (OGAC) field tests have showed some promise for reducing fracture propagation (Hani et al., 2003). Since there are more than 20% air gaps in it, which is substantially higher than in typical asphalt concrete mixes, the term "open graded" is used to describe it. As a "Crack Relief Layer (CRL)," the OGAC mix is used to lessen the reflection of cracks on recently put asphalt overlays. The motion induced by the underlying pavement is relieved by the vast interconnected voids obtained by gap grading an aggregate before it stresses the upper layers of the overlay.

Figure 1. Reflection cracks on overlays with further weakening due to propulsion of secondary cracking

In the event that an aggregate skeleton with positive contact does not form, this could result in a highly compressible mix. According to Vavrik et al. (2002), the Bailey Method of Aggregate Gradation assures strong aggregate interlock, which results in CRL layer that is essentially incompressible un a constrained condition of stress. Therefore, a CRL would act as both a structural layer and a delay mechanism for crack formation. The

Review of Compaction Energies, Fiber Reinforcement and the Function of Human Hair in Improving Pervious Concrete Properties

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ABSTRACT. Innovative material known as pervious concrete has a porous structure that allows water to pass through it and provides a number of environmental benefits. The goal of the current laboratory investigation is to evaluate the properties of various pervious concrete mixtures subjected to different compaction energies. Various amounts of cement, reinforcing fibers, and aggregates with various physical, chemical, and mechanical qualities have been added to the mixtures, changing the water-to-cement ratio while keeping the aggregate size distribution and paste content constant. Pervious concrete (PC) use has a number of positive effects on the environment, the economy, and society. This study aims to assess the mechanical performance of pervious concrete by adding human hair as a reinforcing component. Fiber-reinforced concrete addresses the inherent tensile weakness of traditional concrete by increasing flexural strength and reducing crack development.

KEYWORDS: Human Hair, Compressive Strength, Pervious Concrete, Fiber-reinforced Concrete

1. INTRODUCTION

Pervious concrete can be defined as an open-graded or concrete allows rainwater to percolate to the underlying sub-base due to its high permeability. Pervious concrete is a form of lightweight porous concrete, obtained by eliminating the sand from the normal concrete mix. The advantages of this type of concrete are lower density, lower cost due to lower cement content, lower thermal conductivity, relatively low drying shrinkage, no segregation and capillary movement of water. Water/cement ratios between 0.27 and 0.30 are used routinely with proper inclusion of chemical admixtures and those as 0.34 to 0.40 have been used successfully. The relation between strength and water/ cement ratio is not clear for pervious concrete because unlike conventional concrete. However, the strength of material is relatively low because of its porosity. The compressive strength of the material can only reach about 20 to 30mpa. Such materials cannot be used as pavements due to low strength [11]. Rainwater is seen getting wasted on the roads due to lack of proper design of drainage system. Construction of Pervious concrete pavement (PCP) is one of the best methods to solve this problem. Due to lack of proper design of drainage system, rain water accumulates on the road. This happens mainly as the drainage systems are already clogged in most of the cities. This problem is serious in large cities and industrial areas, where roads are constructed without designing a sewerage system. It may cause erosion of the road and decrease in lifespan of the road [1]. It is observed that cement can be effectively replaced by fly ash which reduces the cost of pervious concrete. On the other hand, the addition of coal fly ash in the concrete mix is reported to increase the compressive strength of concrete. When added to the mixture, coal fly ash reduces the water demand of the concrete by 5–15 percent. It also has a retarding effect which is gainful in concreting in warm weather [19]. Pervious concrete pavement is a unique and effective means to meet growing environmental demands. Pervious concrete has the same basic constituents as conventional concrete that is, 15% - 30% of its volume consists of interconnected void network, which allows water to pass through the concrete [14]. The condition of parking area infrastructure which in the rainy season occurred water puddles which is a common problem that arises this is due to high rainfall is also not able to absorb rainwater runoff into the soil. The use of natural materials for pavement construction is a must in supporting the achievement of green roads [18]. This paper proposes a new mixture design method for porous concrete, named PCD (porous concrete design), and derived from the ACI 522R-10 and ACI 211.3R-02 standards. The aim is to improve mechanical strength in porous concrete mixtures, while ensuring enough permeability for its use in urban roads. There are various types of porous pavement materials, of which the most common and widely studied ones are porous concrete (PC) pavements. However, it is possible that just by changing the dosage method, the mechanical characteristics of porous concrete could improve, while maintaining sufficient permeability for use in permeable pavement systems (PPS). To make a comparison between the mixtures and methodologies, considering mechanical, hydraulic, and safety issues, such as skid resistance [3]. Fiber reinforced concrete provides good flexural strength with less crack developments. Since concrete is weak in tension. So, an attempt has been made to achieve improved strength results using hair as fiber in

Impact of Covid-19 on The Construction and Engineering Industry

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Abstract:
The global disruption triggered by the Corona Virus pandemic has had a significant influence on society, the environment, and the economy. Only two events world wars and the 1918 flu pandemic have had such a wide range of effects over such a brief period of time, including fatalities. Unfortunately, we should brace ourselves for more significant disruptions in the future. The Corona virus has a serious impact on the construction sector, which is the second-most significant sector among all sectors contributing to India's GDP. This paper focuses on the impact of this global epidemic on the world and Indian constructing industries. It also emphasizes the significance of civil engineering & town planning in reducing the pandemic's impact on the construction industry and resuming normal operations with appropriate remedies and mitigation strategies for all sectors that depend on the building industry. After the Corona virus, the future of the building industry is also briefly considered. The moment has come for us to pull up our socks and start searching for more effective planning for the future, not just for urban regions but also for slums, if we want to salvage the future after lockdown. Everyone has a lot to learn from the pandemic. Construction firms should work to make their business models more resilient as they design their recovery roadmaps, and they may concentrate more on plug-and-play solutions such prefabricated ducts & utilities, etc., to enhance the quality and efficiency of project execution. Early in 2020, the COVID-19 pandemic broke out, posing significant problems for the world economy and having an impact on many different sectors. Even the resilient building and engineering industry was susceptible to the pandemic's devastating effects. The multiple effects of COVID-19 upon the construction as well as engineering industries are thoroughly examined in this paper, encompassing disruptions to supply chains, shortages of workers, project delays, financial limitations, and the adoption of creative mitigation techniques. Paper also focuses on the adapting actions made by industry players and offers insights into probable long-term changes and future prospects for the building and engineering industry.

Key Words: COVID-19, Construction Industry, Engineering Sector, Supply Chain Disruptions, Adaptive Measures, Future Prospects.

1. Introduction:

The multiple effects of COVID-19 upon the construction as well as engineering industries are thoroughly examined in this article, encompassing disruptions to supply chains, shortages of workers, project delays, financial limitations, and the adoption of creative mitigation techniques. The report also focuses on the adapting actions made by industry players and offers insights into probable long-term changes and future prospects for the building and engineering industry. Particularly at Nagasaki and Hiroshima, when the nuclear bombs decimated not just the present day but also the past as well as the future of that Country, Japan, was the savage anger of retribution on display. We can still see the nuclear evil there ringing in the distance. Even more comprehensive improvements have been made to the building. Take a look at the situation right now. Once more, history is repeating itself. Humans and the Corona Virus are engaged in a virtual conflict.

This is a virtual conflict, not a battle of weapons. Its fury is visible not just in particular countries but also throughout the entire world. Why not build after this pandemic war if development had begun after nuclear destruction? Since the beginning of time, building has been a basic need for people. But only briefly because of

Advancing Groundwater Recharge: Harnessing Man-Made Conveyances for Sustainable Aquifer Enhancement

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ABSTRACT

The process of improving naturally occurring groundwater supplies by means of artificial conveyances such as infiltration basins, trenches, dams, or injection wells is known as groundwater recharge. One particular kind of recharge that increases groundwater resources and recovers water for later use is called aquifer storage and recovery, or ASR. Water moves through the saturated zone in a complicated process that might be facilitated by hydraulic or gravity forces. Large errors in recharge estimates and unmetered groundwater consumption are common in groundwater modeling studies, and these can have an influence on ecosystems that depend on groundwater, extractive industries, and sustainable yields. In order to artificially recharge aquifers, surface water is placed in basins or furrows, where it seeps into the ground and descends to replenish it. Permeable surface soils are necessary for this technique, which is being employed more and more for subterranean storage. Test basins and field research are required to forecast system functionality. The quality of the water is assessed, with a focus on geochemical reactions in the aquifer and fouling layers on basin bottoms. Periodically pump recharge wells to backwash clogging layers.

Keywords- Water, Groundwater, Recharge, Aquifer, Sustainability

1. INTRODUCTION

The growing global population, expansion of irrigated agriculture, and economic development are contributing to an escalating worldwide demand for water resources. While surface water sources can potentially meet this demand, regional disparities result in water scarcity issues in various parts of the world. Currently, more than 2 billion people, equivalent to 35% of the global population, grapple with severe water stress. In regions prone to recurring water stress and possessing vast aquifer systems, groundwater often serves as an additional water supply. However, if the rate of groundwater extraction surpasses the rate of groundwater replenishment over extensive areas and an extended period, it can lead to overexploitation or persistent groundwater depletion. Replenishing groundwater or aquifers is imperative, encompassing natural recharge as part of the natural hydrological cycle, as well as human-induced recharge, achieved either directly through methods like spreading basins or injection wells, or indirectly due to human activities such as irrigation and waste disposal. The practice of artificial recharge with surplus surface water or treated wastewater is on the rise in various regions, playing an increasingly significant role within the overall hydrological cycle.

Evaluating the water quality prior to recharge plays a pivotal role in evaluating the risks linked to human exposure to chemical pollutants and pathogenic microorganisms that might be present in the source water. The depletion of groundwater can yield devastating consequences, impacting natural streamflow, groundwater-dependent wetlands, and ecosystems. In deltaic regions, this depletion may result in land subsidence and the intrusion of saltwater.

The report offers a comprehensive global assessment of groundwater depletion, achieved by analyzing groundwater recharge through a global hydrological model and deducting estimates of groundwater extraction. The analysis is specifically focused on regions with sub-humid to arid climates to mitigate issues tied to increased discharge capture and enhanced recharge resulting from groundwater pumping. Furthermore, the report examines the challenges and uncertainties linked to the artificial recharge of groundwater using source

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Digital and Online Education System in India

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Abstract

India becoming a global leader in Information Communication and Technology along with domains like space. The Digital India Campaign is encouraging to transform the whole nation into a digitally empowered community. Quality education playing very important role in this transformation and technology itself playing an important role in the improvement of educational processes and outcomes. This paper examines the emergence of Digital and on-line Learning environments and along with the reasons for its appearance. The recent advancement of wireless net and mobile communications devices has provided exceptional opportunities for 21st century mixed learning models along with on-line and face-to-face learning. In response to those developments, several innovative learning environment has been trialed at various platform. The potential of technology enabled teaching, will facilitate us in establishing the knowledge society, which in turn will help us in improving our GDP and nation growth. Our educational institutions were built in line with industrial era rather than a digital era. Thus, teachers and students are faced with a massive challenge of change. Applicable integration of technology into all levels of education to support teacher preparation and development, improve teaching, learning and analysis processes, enhance instructional access to deprived groups and streamline educational planning, administration and management. Since technological changing very rapidly, it is essential to find out key technology trends in order to identify ways in which education can leverage not just current technologies but emerging technologies as well.

Keywords: Digital, Education, Online, Technology

Introduction

In the era of technological revolution, the entire mankind is encompassed, immersed and depend upon the technology. The rate at which the technological innovations is far ahead when compare to the knowledge/skill updating of the individual learners. The infusion of technology has revolutionized the various walks of life and everyone felt it is indispensable to live without technology. Technological innovations lead to massive changes in the economy, in providing network and communication to each other. The potential of technology enabled teaching, will facilitate us in establishing the knowledge society, which in turn will help us in improving our GDP and nation growth. The major challenge exists in equipping our educational institution with digital learning space or environment. Our educational institutions were built in line with industrial era rather than a digital era. Thus, teachers and students are faced with a massive challenge of change. There is a transition from chalk and talk to click and talk. Skill set required in the digital era for establishing the sound & healthy knowledge society communication skills , the ability to learn independently , ethics and responsibility , teamwork and flexibility , digital skills knowledge management. Quality education will play very important role in this transformation and technology itself is playing vital role in the improvement of educational processes and

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HEAT TRANSFER COEFFICIENT ENHANCEMENT IN NATURAL CONVECTION FROM HORIZONTAL RECTANGULAR FIN ARRAYS WITH PERFORATIONS

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ABSTRACT

The overall convection heat transfer coefficients for long horizontal rectangular fin arrays are low because the surfaces in the inner region are poorly ventilated. In this study, perforations through the fin base are introduced to improve ventilation with cold air from below the fin base. Aluminum fin arrays with length L= 380mm, fin height H = 38mm, fin thickness t_f = 1mm, and fin spacing S = 10mm are analyzed experimentally and numerically using ANSYS 14.0 so as to obtain the temperature distribution along the fin height and fin length. In this work the fin array configurations are tested experimentally with two different heater input as 50W and 65W. The heat transfer coefficient for fin array with perforations in fin base increased by the enhancement factor of 1.49 and

1.42 as compared to fin array without perforation with 50W and 65W heater input respectively. The heat transfer coefficient for the same fin configuration is also increased with increase in heater input from 50W to 65W. Experimental and numerical results for the temperature distribution show a difference of 5-9%. The distribution of heat flux obtained with ANSYS 14.0 quantitatively follows the trend of the same reported in the literature review.

Key words: Perforation, Fins, Steady state, Natural convection.

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A novel approach for intrusion detection in mobile ad hoc networks

Bhushan S. Chaudhari and Rajesh S. Prasad

ABOUT

Abstract

Mobile ad hoc network (MANET) consists of various nodes and they interact with each other cooperatively. However, the cooperative nature of MANET provides a gateway for intruders to interrupt the communication. Two types of approaches have been proposed for the IDS in the literature. The first approach has been used for the improvement in the conventional models and the second approach based on the unconventional models. Our focus is on the unconventional methods since they perform better in the diversified environment. A number of unconventional methods viz. Watchdog, EAACK, etc. have been discussed in the literature. However, intrusion detection model based on particle swarm optimization (PSO) for distributed and advanced attacks have not been discussed yet. In this paper, we proposed a novel approach based on PSO for the IDS in MANET. The proposed model is compared with existing models like Watchdog and EAACK. Comprehensive objective function in the evaluation of node trustworthiness is a key point of this model.

Keywords

mobile ad hoc network, intrusion detection system, particle swarm optimisation, PSO, watchdog, enhanced adaptive acknowledgement, EAACK

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Generation, Distribution and Utilization of an Electrical Energy in Industrial and Domestic Buildings

Bhushan C. Behede, Mohammed. Juneduddin, Yogesh D. Sonawane, Dattatray S. Doifode, Mahesh Dalwani

Abstract:If we look back few years into the past, we come to know that with the rapid development of human societies, day to day modern life and smart industries, etc. becomes so hungry and greedy for electrical energy. Today, Electrical energy is being consumed by every single machine used in almost each and every application. Conventional and nonrenewable sources like coal, oil, gas, etc. have been depleting very fast, and the world should now shift more towards renewable sources like solar, wind, tidal, etc. for harnessing electricity. Electricity consumption is increased in the industrial and domestic sectors due to the increased comfort (air conditioning) requirements, increment in the usage of power-consuming devices and the sudden increment in building occupancy area. This paper shows the current status of demand and supply scenario of electrical energy in the world and India. Generation capacities as per the renewable and nonrenewable sources in India have been discussed in detail. Almost 45% share of the electrical energy consumed in the industrial or commercialized and domestic buildings is consumed for air conditioning purposes. the brief discussion is presented in this paper on the sales and distribution of the air conditioning units and future possibilities in the same field as per the sustainable development scenario.

Keywords:Air-conditioner, buildings, electricity, renewable energy

I. INTRODUCTION

India stands at the 3rd position in terms of economy and 2nd in terms of population in the world. electricity demand of such a large and diverse country is very high and it is increasing day by day. if we look at the figures then India having an 18% share in the population of the world. Electrical energy consumption in India is almost doubled from 2000 to date [1].

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It has been anticipated that the commercial, industrial and civil building sector of India will reach up to 66% of the land occupancy by 2030. Every year roughly 900 million square meters of the land will be built up by the industries and domestic buildings which are like adding roughly two Mumbai cities in just one year only [2]. if no energy is conservation programs were adopted then electricity consumption in such buildings will be doubled by 2030 than it was in 2010 [3]. Electricity demand in the civil and commercial buildings sector rises by around 8% per year from 2000 to 2013. As per the International Energy Agency (IEA), almost 33.33% of global final energy is consumed by the domestic and industrial buildings and associated sectors. Also, almost 40% of total global direct and indirect CO2 emission is also contributed by the same sectors. Energy demand in these sectors is continuously rising and this rate is more in China and India. The possible reason behind this is the greater comfort requirements, increment in power-consuming devices, and sudden increment in building occupancy area [4]. If we talk about the energy intensity reductions in buildings then, the speed of energy intensity reductions has reduced during the last few years, roughly from 2% in 2015 to 0.6% in 2018. Note that this is less than the floor area increase which is 2.5% between 2017 to 2018 (i.e. in one year). This decelerating and demotivating energy policy progress, clearly shows that the development of buildings and associated alike sectors are not in tune with the rapid development in growing economies. To achieve the goal of reaching the Sustainable Development Scenario (SDS), the annual reduction in energy intensity per square meter globally required to be a minimum of 2.5% [4].

In India, coal is the major source by which electricity is harnessed. almost 75% of the electricity comes with coal. Coal accounts for the largest share of electricity generation at 38% in the world. Followed by China, India is at the second position when it comes to the consumption of coal [4]. India's national coal mining company called, Coal India Limited (CIL) produces 84 % coal which is the largest coal production in the world. The coal used in the power sector alone surpassed the limit of 10 Gt CO2, mostly in Asia which includes major countries like China and India. Till Nov. 2019, India had a coal reserve of 98 billion tonnes (approx.) which is roughly 9.5% of the total coal reserves of the world, Also, having overtaken the US already in 2015[5]. As of January 2019, India has 221 gigawatts of coal operating power plants. According to a global plant tracker [5], 11% of global coal power operating power plants are in India. There is a concern in India over the health impact of coal operated power plants.

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Comparing geometric parameters of a hydrodynamic cavitation process treating pesticide effluent

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ABSTRACT

Paper focuses on comparison between two different orifice plate configurations (plate number 1 and plate number 2) used as cavitating device in the hydrodynamic cavitation reactor for improving pollutant removal efficiencies. Effect of four different parameters such as hydraulic characteristics (in terms of range of flow rates, orifice velocities, cavitation number at different inlet pressures); cavitation number (in range of 5.76-0.35 for plate number 1 and 1.20-0.35 for plate number 2); inlet pressure (2-8 bars) and reaction time (0 to 60 min) in terms of chemical oxygen demand (COD) removal and chlorpyrifos degradation has been studied and compared. Optimum inlet pressure of 5 bars exists for degradation of pollutants for both the plates. It is found that geometry of orifice plate plays important role in removal efficiencies of pollutant. Results obtained confirmed that orifice plate 1 with configuration of 1.5 mm 17 holes; cavitational number of 1.54 performed better with around 60% COD and 98% chlorpyrifos removal as compared to orifice plate 2 having configuration of 2 mm single hole; cavitational number of 0.53 with 40% COD and 96% chlorpyrifos in 2 h duration time.

Keywords: Chemical oxygen demand, Chlorpyrifos, Degradation, Efficiency, Hydrodynamic cavitation, Real effluent

1. Introduction

Intensive agriculture has resulted into development of the agro-chemical industries [1]. This has resulted into uncontrolled manufacturing of pesticides (factories area), storage (factories and agricultural area) and uses, especially in lower-income countries [2]. There are different types of stages through which pesticide wastes are formed. It includes manufacturing, use and storage, etc. Extreme use leads to contaminate water with high concentrations of pesticides [2]; with number of pollutants being detected in natural water resources [3]. Also, in municipal waste water treatment plants, some products of these hazardous pollutants have been detected [4]. Even if these pollutants are present in very low/less concentrations, they are considered toxic and detrimental [5]. High toxicity and low biodegradability of these products is main concern for the environment [4]. Also they affect aqueous habitats and cause threat to human health [3] and thus their removal from the contaminated water is of high priority [5].

Chlorpyrifos is the common name for the chemical 0,0-diethyl 0-(3,5,6-trichloro-2-pyridinyl)-phosphorothioate. Chlorpyrifos is broad spectrum pesticide, which belongs to organophosphate group of pesticides, and is used world-wide for different applications such as agriculture, pest control, etc. Its wide use has resulted into uncontrolled manufacturing and contamination of environmental matrices. In USA, Dow Chemical Company registered it firstly for use in 1965 [6]. Chlorpyrifos acts against various range of disease causing elements, is used widely in residential and agriculture pest control all around the world. Human exposure to CPF may cause chronic effects such as impaired memory and concentration, headache, confusion, nausea, weakness, etc. [7-10]. Use of chlorpyrifos causes greater health risk when it exceeds acute exposure levels [11]. It persists in nature for relatively long period due to its physicochemical and structural properties, low volatilization and degradation under aerobic conditions. By comparing risks of CPF, using standard risk quotient approach, results indicates that CPF has second or third highest risk quotient to terrestrial species comparing to other insecticides and first or second highest risk quotient to aquatic species [12]. Thus, effluent comprising this pesticide is procured and chosen as model pollutant in this study.

For achieving effective removal of pollutant, ideal treatment method should be qualified/appropriate, should perceive complete mineralization rapidly and should be suitable for small-scale waste

A Suggestive Low Power TIQ Comparator Architecture using Adiabatic Logic for Implementation of 3-bit Flash type ADC.

Vishal Moyal

Abstract: Power consumption is prime concern for the designers in modern day scenario. For the devices that are power-driven by tiny rechargeable or non-rechargeable batteries over the entire life period, such as medical transplant devices or portable medical instruments, necessitates lowest possible power consumption. In these devices Analog-to-Digital Converter (ADC) isdynamic component to provide connectionamongstAnalog and Digital system. The paper is aimed to report the design contests and tactics for low power ADCs which are used in biomedical graft devices and instruments. A comparator module of ADCs used in designing of such devices requires more power than other blocks in the device, a low power comparator is suggested for Threshold-Inverter-Quantizer (TIQ)usingDiode-Free-Adiabatic-Logic (DFAL) to implement Flash type ADCs. The projected 3-bit Flash ADC is simulated using Cadence ® Virtuoso IC616 with TSMC 65nm technology. The ADC was simulated atpeak to peak voltage of 1.2V andcapacitive load of 1fF,results in consumption of5.53 µW of average power, which is 66.03 % lesser relative toconservative CMOS-TIQ based comparator. Observed static parameters are: DNL is equal to-0.62 / + 0.57 LSB and INL is equal to- 0.44/ +0.41 LSB.Dynamic parameters observed results are as: THD = -25.25dB, SNR=19.45 dB, SNDR=18.39 dB, ENOB=2.76 bits, SFDR = 23.4 dB.

Keywords : CMOS, PMOS, NMOS, ADC, TIQ,DFAL, VTC, MUX, LSB, DNL, INL, SFDR,SNR, ENOB.

I. INTRODUCTION

Analog-to-Digital-Converter is vital structuralparameter in most of the modern-day devices. In the recent past, most of the portable and implantable devices are constructed with very strict necessities for reduction in power consumption. In the electronic systems, used to designdevices which will be implanted in the human body; for which consumption ofpower is becoming one of the most thoughtful aspect. This saving in the consumption of power upsurges the necessity for the development of system built using constructional blocks which operates on low voltage and consumes lowestpossible.

AnalogtoDigital Converters (ADCs) renderanalog parameter into its equivalent digital signal, commonly castoff in handing out the information, data computing and transmission system. ADC isthe crucial components for the various devices, to maintain the power dissipation at lowest possible value. Medical electronics devices like Pacemakers and Electro-Cardio-Gram machines are distinctive examples of devices which requires very less consumption of power.Analog-to-digital convertersaredecisiveportion of these devices because of its property of consumption of power. Therefore, reducing the power dissipation of the ADCs is utmostvitalconcern. Low power ADC with low sampling frequency and modest resolution is suitable for such application. These specifications make Flash ADC the suitable choice for those devices Flash ADC is cast-off for the high-speed, low resolution applications.[1]-[5]

In the suggested work, it is considered to design aThreshold-Inverter-Quantizer based on logic of energy recovery known as Diode-Free-Adiabatic-Logic(DFAL-TIQ-Comparator)for implementingAnalog-to-DigitalConverter which consumes less power. TSMC 65nm technology is used on Cadence® Virtuoso IC616 for parameter extraction.

II. DFAL: DIODE-FREE-ADIABATIC-LOGIC

Inpast decade, adiabatic-logic played a significant role in the designing of power efficient portable devices, because they outperform conventional CMOS counterpartsas far as the consumption of power is concern. ConventionalCMOS circuit's power consumption is given by following mathematical relation,

$$P_{diss} = C_{Load} \times V_{dd}^2$$

<div align="right">1)</div>

Theinvestigatorsfocused their attentiontoreduce power supplyandcapacitive load (C_{Load}), to decrease dissipation of power, but those efforts were not enough to design modern-days power hungry device.The projecting feature of DFAL circuit is that,it doesn't contain any diode; there is a rare chance of presence of a diode in its path for charging or discharging cycle.[6]-[7]

DFAL inverter depicted in Fig. 1, incorporates split-level sinusoidal clock V_P and V_{PC}as power supply, and is kept 180^0 out of phase.Voltage level of $V_P$surpassesV_{PC} by amount$V_P/2$,which willexpressively reducevoltage varianceamongst probes,subsequently power consumptionwill be condensed.

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THERMO ELECTERIC AIR CONDITIONING AN ALTERNATIVE TO CONVENTIONAL AIR CONDITIONING SYSTEM

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Abstract: Today's present HVAC system is very efficient and reliable but it has some demerits. It has been observed during the last two decades that the O layer is slowly destroyed because of the refrigerant (CFC and HFC) used for the refrigeration and air conditioning purposes. A single molecule of HFCs can destroy thousands of Ozone molecules, Even the percentage of HFC's are emitted into the atmosphere compared to CO2 is negligible but its global warming effect is few thousand times of CO. The effect of 100 gm of HFC's can destroy 0.5 tons of Ozone molecule. These HFC's once destroy O-layer; it takes lack of years to recover its thickness as it is formed by complex reactions.

Thus in order to tackle this problem thermoelectric phenomenon is taken into account to deal Thermoelectric cooling, commonly referred to as cooling technology using thermoelectric coolers (TECs), it has advantages of high reliability, no mechanical moving parts, compact in size and light in weight, and no working fluid. In addition, it possesses advantage that it can be powered by direct current (DC) electric sources and alternating current (AC) electric source

Index Terms – HVAC, HFC'S

I. INTRODUCTION

ii Thermoelectric phenomena is based on Peltier Effect which was proposed by Sir Jean Peltier in 1834 It states that "when an electric current flows across two dissimilar conductors, the junction of the conductors will either absorb or emit heat depending on the flow of the electric current. The heat blot up or released at the junction is proportional to the input electric current. The constant of proportionality is called the Peltier coefficient.

iii It use a very simple concept of running on a temperature difference and as long as this criteria is being fulfilled, energy is produced. The idea of thermoelectricity can be classified into 2 parts. Thermoelectric Coolers (TEC) and Thermoelectric Generators (TEG). There have been quite a few number of applications in the recent past and the number of applications are upcoming with time. Thermoelectrics has found its route into air conditioning systems, automobile applications, solar energy applications and many others.

iv Thermoelectric cooling: thermoelectric cooling uses the Peltier effect to create a heat flux between the junctions of two different types of materials. A Peltier cooler, heater, or thermoelectric heat pump is a solid-state active heat pump which relocates heat from one side of the device to the other, with consumption of electric energy depending on the orientation of the current. Such an gadget is also called a Peltier device, Peltier heat pump, solid state refrigerator, or thermoelectric cooler (TEC). They can be used either for heating or for refrigeration. Although in practice the main application is cooling. It can also be used as a temperature monitor that either heats or cools-

1.1 PROPOSED METHODOLOGY

The project used a structured system analysis and design methodology approach to achieve the project objectives. Block system analysis of the project is shown above (Figure 1.1) with the use of block diagram. TECs are sandwiched in between heat sinks. Glacial air is blown out from one end of the cold heat sinks. The TECs were powered by a power supply.

Figure 1.1 Block Diagram of Thermoelectric Setup

POWER GENERATION USING PERMANENT MAGNETIC GENERATOR THROUGH BRAKING SYSTEM FOR TWO-WHEELER.

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Abstract: In contrast with the past, lot of companies are trying to make a successful electrical vehicle but they cannot. The main elements of electrical vehicles are the battery and their charging systems. We have tried to increasing the source of battery charging in two-wheeler. This paper gives the clear understanding of Permanent Magnet Generator system used in two-wheeler to charge the battery with the help of braking system. By using magnets and stator coil setup which assembled in rear wheel of two-wheeler. When brake applies the permanent magnet generator system activates and will produce electrical energy used to charge the battery. The Permanent Magnet Generator is light in weight, easy to handle and low cost, hence it has wide application in two wheelers.

Index Terms - **Braking, Permanent Magnetic Generator (PMG), Rear wheel, Battery charging.**

I. INTRODUCTION

In the society, the word energy is used as a synonym of energy resources, and most often refers to substances like fuels, petroleum products and electricity in general. These are sources of usable energy, in that they can be easily transformed to other kinds of energy sources that can serve a particular useful purpose. The world however is facing a crisis in energy resulting in low supply, increasing costs and a great inconvenience to those who depend on electricity for their heating, ventilation and water supply. Permanent magnet generator has been used for wind turbines for many years. Many types of generator concepts have been and proposed to convert wind power into electricity. Permanent magnet generators are highly efficient, robust and reliable. There is no need of external excitation. The field winding losses are eliminated from the rotor. The availability of high energy density magnets such as neodymium-iron-boron (ndfeb) allows the design of a generator required by direct coupled saws. In electromechanical energy conversion, employing generators and motors play a crucial role in energy consumption and production. For this reason, the improvement of efficiencies in generators and motors is more crucial in the battle against climate change and increasing energy requirements. Electromechanical power conversion based on permanent magnet technology is inevitably when energy efficient solutions for generating and motoring are considered. Sophisticated energy conversion technologies with permanent magnets also make it possible to create a new conversion instruments for competitive distributed energy technology. Permanent magnet has been used industrially since the invention of the first carbon steel permanent magnet materials in the beginning of the 20th century. Permanent magnet motors are a well-known class of rotating and linear electric machines used in both motor and generator. Permanent magnet machine has been used for decades in applications where simplicity of structure and a low initial cost were of primary importance. One of the most efficient ways of recovery of energy lost during braking mechanism of vehicles is power generation through braking system. In this braking system, the energy lost in form of heat during braking is stored in the form of electrical energy in batteries by using permanent magnet generator.

II. METHODOLOGY

In this arrangement only one magnet plate and stator coil is used for power generation. A two wheeler bike is used. The Permanent Magnet Generator is mounted on the rear wheel of bike. The coil is mounted at some distance from the PMG. The stator plate is stationary and two coils are mounted on it. The fabrication of permanent magnet generator (PMG) is performed on the alloy wheel and it is made to rotate at the same speed as that of the vehicle. While the stator coil is stationary, the number of turns of coil is selected when brakes are applied and disconnect from it when brake is released. It is mounted near on the axle on which the shock – ups are mounted, thus it will moves along with the wheel when vehicle came across obstacles or improper road surfaces. Also the two terminals are taken from the stator coils which are further connected to rectifier. The rectifier is cooled by providing fins at its outer surface by natural air circulation. Mechanism will come into action only during braking of the vehicle. Thus energy during braking system is recovered to some extent which is either lost in the form of heat.

III. ENERGY CONVERSION MECHANISMS

A Permanent Magnet Generator can be used to convert the mechanical energy pulse to electric form with the help of the electromagnetic effect .Thus converting the magnetic form of energy into electrical forms is not plausible. The Permanent Magnet Generator stator contains 2 coils of copper wire. The coils will be wound on a plywood coil former. The former is mounted on the end of a crankshaft, between cheek pieces.

The Influence of Urbanization on the Sustainability of Dhule City

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Abstract: This study has been initiated to examine the Consequence of Urbanization on the Viability of Dhule City. Our primary goal is to scrutinize how the Urbanization is influencing the city's sustainability. The primary aim is to assess how urbanization is jeopardizing the sustainability of Dhule city. To ascertain the factors that are affecting sustainability, we have identified four key parameters: Land Usage, Infrastructure, Transit, and Industrialization.

IndexTerms – **Study Area, Land Use, Infrastructure, Transportation, Industrialization.**

INTRODUCTION

The main objective is to evaluate how urbanization is harming the sustainability of Dhule city and to provide methods for reducing the impact. Urbanization is the most commonly used phrase all over the world these days, yet it may simply be defined as the result of a population shift from low- to high-utilitarian areas. On a larger scale, urbanization has an impact on the climate, land use, and transportation. Analysis of the reasons of urbanization and recommendations for controlling unplanned growth are the goals of the project. This project also seeks to ascertain the sustainability of the urbanization trend and the effects it will have on the city's sustainability.

In the last two decades, cities in India have expanded quickly. The scenery of many cities has been drastically altered by this growth. Indian metropolitan areas have seen significant changes in their land use and land cover as a result of both socioeconomic and environmental factors. In the coming decades, controlling urban population change will rank among the most significant global concerns. Understanding urban patterns, dynamic processes, and their relationships is a priority since managing and developing urban areas in the future requires in-depth knowledge of these processes and patterns. Understanding the pattern and process of urban growth through remote sensing data helps us comprehend how an urban landscape is evolving over time. In recent years, mapping (to understand the urban pattern), monitoring (to understand the urban process), measuring (to analyse), and modelling (to simulate) the urban expansion, land-use/land-cover change have become common uses of remote sensing data and geographic information system techniques.

For the study of the impact of urbanization we have selected four parameters namely Land use , Infrastructure ,Transportation , Industrialization.

Scenario of Water supply and demand for Cauvery Basin: PODIUMSim Approach

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Abstract : The current water lack is one of the essential world issues, and as indicated by environmental change projections, it will be more basic later on. Since water accessibility what's more, availability is the main compelling component for crop creation, homegrown use, and the water resolving this issue is essential for regions like Tamil Nadu influenced by water shortage. Current circumstances of the investigation region likewise survey in this paper. As an outcome of ex-panding water shortage and dry spell, coming about because of environmental change, impressive water utilizes for irrigation, domestic, and industrial are re-quired to happen with regards to intense contest among agribusiness and differ-ent areas of the economy. Moreover, the assessed addition of the worldwide populace development rate brings up the unavoidable increment of water inter-est later on, with a quick effect on cultivating water use. Since an imperative re-lationship exists between the water assets of a nation and the limit with respect to water interest, evaluating the water system needs is fundamental for water asset arranging to address food issues, homegrown necessities and industrial re-quirements to stay away from extreme water utilization. The complete study is done using PODIUMSIM – Policy Dialogue Model. The basic reason to choose this software is that it enabled the users to develop scenarios of water and food supply and demand with respect to various policy options at national level.

IndexTerms - **Policy Dialogue, Water Demand, Annual Consumption, Seasonal Production, Crop consumption, Water Stress.**

1. Introduction

The PODIUMSim is proposed for strategy organizers, scientists, understudies, and other people who are keen on creating water and food market interest situations under various choices of approaches or theories. It can investigate crucial inquiries, for example, Can River bowls feed their populace in 2025? What is the food excess or deficiency at the sub-public level and along these lines at a public level? Do we have sufficient water to inundate the yields expected to guarantee future public food prerequisites?

The model guides the perplexing connections between various elements (drivers in the model) that influence water and food interest and supply and shows yield data in both graphical and even configurations. Projections for future not really settled corresponding to base year information by the normal changes in the drivers over this period.

PODIUMSim empowers clients to define objectives, for example, food creation for a sufficient degree of per capita utilization, and investigate methods of arriving at that objective: through growing inundated region or rainfed region, expanding trimming force, or bringing in more food. Likely situations can likewise be created as far as populace development, diets, and advancements in farming and water assets; then, at that point decide the fundamental strides to guarantee food security and maintainable water use.

PODIUMSim consists of three main components;
i.   Annual consumption-demand scenario development at national level.
ii.   Seasonal production scenario development for irrigated and rainfed agriculture at sub-national level and, iii.
iii.   Annual water supply scenarios development at sub-national and seasonal water demand scenarios development for irrigated sector and annual water demand scenarios for domestic, industrial and environmental sectors at sub national level.

Taguchi Analysis of Pervious Concrete Mixtures: A Way to Increase Strength and Permeability

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Abstract:

A unique variety of concrete called pervious concrete is created by combining water, cement, and open-graded coarse particles. Usually, it contains very little to no fine aggregate concrete and only enough cement paste to coat the aggregate particles while preserving the interconnectedness of the spaces. The terms porous concrete, permeable concrete, no fines concrete, gap graded concrete, and improved porosity concrete are also used to describe pervious concrete. The experimental technique and findings for compressive strength, flexural strength, and permeability are presented in this work. Using Taguchi analysis, we were able to create an experiment with three variable factors—the mix proportion, the percentage of fine aggregates, and the percentage of human hairs as fibers—each with three levels. L9 arrays were utilized in this experiment. While varying the proportions of human hair as fibers of fine aggregate with coarse aggregates from 0.25%, 0.50%, and 0.75% of human hair of 0%, 5%, and 10% of fine aggregate accordingly in each proportion, the w/c ratio of 0.4 was used in this study. Whose findings show that the maximum compressive strength of M9 mix is between 1.45 and 3.48 N/mm2, the maximum flexural strength of M9 mix is between 0.135 and 2.11 N/mm2, and the maximum permeability of M8 mix is between 91.67 and 163.70 M/hr. That goes to show that adding more fibers helps to boost flexural strength, while adding more fine aggregates increases compressive strength at the same time.

Keywords: Pervious Concrete, Taguchi Analysis, Flexural Strength, Human Hair, Compressive Strength

Introduction:

The term "pervious concrete," also known as "porous concrete," "permeable concrete," or "gap-graded concrete," refers to a particular type of concrete composition. The absence or limited presence of fine particles, with the main ingredients being water, cement, and open-graded coarse aggregates, sets it apart from conventional concrete. Just enough cementitious paste is used in pervious concrete to coat the aggregate particles and preserve the structure's interconnecting spaces (Gray, 2013).

Concrete that is permeable or porous is known as pervious concrete and is a prime example of cutting-edge building materials. Due to its distinct qualities, it is becoming an increasingly attractive option for a variety of applications, especially in the context of ecologically friendly and sustainable construction. The management of stormwater runoff and its accompanying difficulties are of utmost importance as urbanization continues to alter landscapes and increase the amount of impervious surface area in cities.

Pervious concrete is fundamentally unique due to its composition. It has open-graded coarse aggregates in addition to a purposeful reduction in fine particles. This unique concrete mix design creates spaces that, when connected, allow water to permeate the surface and seep into the ground below. As a result, pervious concrete can greatly reduce stormwater runoff, lessen floods, and lessen erosion. This ground-breaking material demonstrates a variety of advantageous traits, including high porosity, which makes it possible for it to effectively regulate stormwater runoff, lessen floods, and reduce erosion (Aron, 2017). Additionally, pervious concrete helps to improve groundwater recharge, reduce the impact of the urban heat island, and support sustainable urban growth (Geosyntec, 2015).

This work includes a thorough analysis of important mechanical characteristics, including as compressive strength, flexural strength, and permeability, in an effort to better examine the

Analysing Structural Behaviour under Dynamic Loading with Soil-Structure Interaction

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Abstract: Several studies have shown that the Soil Structure Interaction plays a major role in the extent of damage caused by the recent earthquakes. It has been discovered that the performance of the structure is greatly impacted by the interaction between the soil and the structure. This research presents the impact of soil-structure interaction on the natural period, vibration mode, damping, and dynamic response of the structure.

Keywords: Foundation, Loading, Soil-Structure Interaction.

Introduction

The majority of civil engineering constructions have some kind of ground-contact structural component. When these systems are subjected to external stresses like earthquakes, neither the ground displacements nor the structural displacements occur independently of one another. Soil-structure interaction (SSI) is the process by which the motion of the structure affects the response of the soil and the response of the soil influences the motion of the structure. Traditional structural design techniques disregard the impacts of SSI. For light structures in moderately stiff soil, such low-rise buildings and basic inflexible retaining walls, neglecting SSI makes sense. However, the impact of SSI becomes more noticeable for large, heavy structures that are supported by comparatively soft soil, such as elevated roadways, high-rise skyscrapers, and nuclear power plants.

Damage incurred during earthquakes, such the Kobe Earthquake of 1995, has also brought attention to the fact that a structure's seismic behaviour is greatly influenced by the ground's and the foundation's responses in addition to the superstructure's. Because of this, current seismic design codes, like Standard Specifications for Concrete Structures: Seismic Performance Verification (JSCE 2005), mandate that the superstructure, foundation, and ground should all be taken into account when conducting a response analysis.

An engineering structure's seismic reaction is influenced by the medium it is built upon. A "fixed-base" structural reaction happens on solid rock, and it can be assessed by letting the foundation experience the same "free field" ground motion that would happen in the absence of the structure. On a deformable soil, on the other hand, there is a feedback loop in which the soil reacts to the dynamics of the structure and the structure responds to the dynamics of the soil. The interaction of the input motion, the structure, and the properties of the soil then controls the structural reaction. The phenomena known as soil-structure interaction, or SS, has drawn attention from researchers for the past forty years.

In terms of structural response, SSI has two main consequences as compared to the equivalent fixed-base system. First off, the SSI system's dynamic characteristics have changed due to its increased number of degrees of freedom. Secondly, radiation waves that radiate back into the soil from the vibrating foundation-structure system or hysteretic material damping in the soil may dissipate a substantial portion of the vibration energy of the SSSI system. As a result, SSI systems exhibit longer natural vibration periods than their equivalents with fixed bases.

According to certain rules of practice for seismic design, the structure's seismic response will benefit from any extension of the natural vibration period. However, based primarily on the design response spectrum at the site, SSI effects may result in an increased structural reaction in specific seismic and soil environments. Furthermore, the simplification fails to take into account the fact that free-field ground motion does not affect a structure that is suffering SSI. Rather, the dynamic features of the superstructure and the characteristics of the foundation soil determine the input motion. Even though they have significantly improved due to recent developments in information technology and numerical processing, SSI analysis techniques that were created in the late 1960s and early 1970s are still in use today. The sub-structuring method is especially well-liked. advantageous for the structure's seismic reactivity.

The initial difficult problem can be solved quickly and easily by breaking down the soil, foundation, and building domain into multiple smaller domains. Though theoretical solutions have also been created that shed light on the physical phenomenon, methods utilizing sub structuring are restricted to the linear elastic or viscoelastic domain since they rely on the idea of superposition. However, before the resulting analytical solutions are implemented in engineering practice, they must be experimentally verified.

Navigating Dhule's Future: A BRTS Estimation Survey for Urban Mobility

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Abstract: India's rapid urbanization and economic growth have led to traffic congestion, pollution, and challenges in its cities. With a surge in private vehicles, urban planners are designing mass rapid transit systems to ensure safe and environmentally friendly mobility. Dhule, a smart city, is exploring measures to encourage public transportation, with Bus Rapid Transit Systems (BRTS) emerging as the most suitable mode for a mass transit system. This research project aims to analyze the existing transportation system in Dhule and the proposed BRTS system. A preference survey is being conducted to assess commuters' willingness to shift from their current mode of transport to the BRTS. Urban transport modeling, consisting of four steps, is used to predict travel patterns and evaluate pre- and post-BRTS implementation scenarios using a transport ecological footprint analysis.

Keywords: Sustainable transport modes, Bus rapid transit system, Stated preference survey, Mode shift, Transport ecological footprint.

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1. Introduction (Times New Roman 10 Bold)

The rapid urbanization and economic growth in India have exerted significant pressure on cities across the country, leading to issues like traffic congestion, pollution, and other related challenges. While large cities witness a surge in private vehicles, medium and small cities grapple with informal sector-provided intermediate public transport. In response to these urbanization challenges, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched in 2005, aimed at promoting sustainable service enhancements in urban agglomerations with populations of one million or more. This initiative includes the introduction of the Bus Rapid Transit (BRT) System. JNNURM is overseen by the Prime Minister's Office, the Ministry of Finance, and the Ministry of Urban Development, in collaboration with eligible state and local governments for project funding. Drawing heavily from the National Urban Transport Policy, the mission advocates for investments in infrastructure and the reform of Road Transport Corporations (RTCs). The primary objective is to establish rapid transit networks in major Indian cities, with BRT as the central mode for cities with populations under one million. For cities exceeding five million people, rail-based technologies are recommended.

Sustainable transport systems are designed to reduce emissions, lower fossil fuel consumption, and minimize land usage while ensuring accessibility for the public. Prioritizing public transit, cycling, and walking plays a pivotal role in sustainable development. The Bus Rapid Transit System (BRTS) is increasingly adopted by cities seeking cost-effective transit solutions and addressing environmental concerns. The concept of an ecological footprint has gained prominence in the context of sustainable development. It calculates the resource consumption and waste assimilation requirements of a specific human population or economy in terms of the corresponding productive land area. This ecological footprint can be integrated into transport planning to regulate transport activities that have detrimental effects on the environment.

2. Significance of the Study

Dhule city is currently grappling with a decline in the quality of its public transit services, which has led to a notable increase in the use of motorcycles and auto-rickshaws. These modes of transportation have become the primary contributors to motorized travel, with buses being relatively scarce. Additionally, the city has experienced a reduction in national highways and relies on a railway connection between Dhule and Chalisgaon. To alleviate traffic congestion and enhance travel comfort, efforts are being made to establish industrial estates. In light of the need to reduce energy consumption and emissions, it is imperative to prioritize sustainable transportation modes, including public mass transit and non-motorized transport. The study also investigates the travel patterns of the urban poor and evaluates whether the Bus Rapid Transit System (BRTS) caters to their accessibility requirements. The research is primarily focused on analyzing the shift from existing modes of transportation to BRTS in its initial and subsequent phases.

To alleviate traffic congestion and the heavy usage of the Central Bus Stand, Deopur has recently established a new bus stand. This new facility manages 120 daily routes and is linked to the Central Bus Stand through a fleet of four 25-seater mini-buses. In July 2016, city-bus services were inaugurated for four routes, connecting Laling to Nagav, Fagne to Morane, Walwadi to Vadjai, and CBS to ChakkarBardi.

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Design and Fabrication of Automatic Sewage Cleaner

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Abstract -Sewage systems play a crucial role in managing urban wastewater, but they often face blockages due to the accumulation of non-biodegradable waste materials. These blockages result in overflow, leading to flooding and various associated problems. Common culprits for clogs include nylon, plastic, bottles, and empty cans that find their way into the sewer system. Currently, clearing these obstructions is a costly and sometimes hazardous process, involving either suction machines or manual intervention, jeopardizing the health of unskilled workers. In this research, we present the development of an innovative solution, an Automatic Sewage Cleaner, designed to effectively clear sewage system blockages. Unlike traditional methods that are weather-dependent and inefficient, our system operates consistently, regardless of weather conditions. Moreover, it ensures the proper disposal of the separated solid waste, preventing littering in the surrounding areas.

Keywords: **waste products, drainage system, non-biodegradable, sewage system, solid wastes, sewage system cleaning, and drainage pipes.**

1. INTRODUCTION

Sewage, wastewater, and rainwater management are essential components of urban infrastructure, relying on an extensive network of underground drainage systems and gutters to transport these fluids away from residential areas [1]. The proper maintenance of these drainage systems is of paramount importance, as neglect can lead to a host of significant problems. Foremost among these issues is waterlogging, a condition that poses a multifaceted threat to both the structural integrity of roads and the well-being of human and animal populations [6].

Waterlogging, if left unchecked, can undermine the very foundations of road structures that serve as conduits for these drainage systems [6]. In addition to compromising infrastructure, waterlogging can engender a spectrum of health hazards [2]. Diseases like Tuberculosis, Pneumonia, Diarrhea, Tetanus, and Whooping Cough can proliferate in areas affected by stagnant water [6]. Furthermore, the breeding grounds for disease-carrying mosquitoes, such as those responsible for Dengue and Malaria, are readily established in waterlogged regions [6]. The stench and discomfort associated with waterlogged areas contribute to the degradation of the living conditions for residents in proximity to these zones [6].

The accumulation of waste and debris within these drainage systems can yield harmful gases, including methane and carbon dioxide, exacerbating environmental concerns [4]. The current practice of manual cleaning of these sewage lines poses not only physical hazards but also ethical questions regarding the well-being of the individuals tasked with this perilous work [8]. Prolonged exposure to water laden with sewage waste is a life-threatening occupational risk [8].

This research paper aims to introduce an innovative solution to these pressing challenges through the development of an Automated Sewage Cleaner [8]. By automating the sewage cleaning process, the project strives to minimize human involvement and direct contact with waste matter, significantly enhancing safety and efficiency [8]. The potential applications of this equipment extend beyond residential areas, as it can find utility in industrial contexts for cleaning interconnected canals and in agricultural settings for canal maintenance [8]. The goal is to provide a comprehensive solution that mitigates risks, reduces human effort, and ensures the effective management of drainage systems [8].

The basic objective of this research is to find a solution for various problems caused by sewage waste, to develop an automated drain/gutter cleaner to reduce human efforts, to overcome the problem of waterlogging caused by over flooding of sewers because of excessive waste and to stop the spread of various waterborne diseases caused by waterlogging and to stop breeding of mosquitoes and health hazards related to mosquitoes [8].To prevent cleaner's direct contact with the sewage waste [8].

Design of Phase Change Material Based Insulation for Building

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Abstract: This research paper tackles the critical environmental issue stemming from a drastic increase in atmospheric pollutants, including NOx, VOC, CO2, SOx, dioxins, and furans over the past decade. These pollutants have caused global concerns, such as rising temperatures, elevated CO2 levels, and the subsequent melting of polar ice caps, leading to rising sea levels. This environmental crisis is largely driven by the growing reliance on power plants to meet the escalating demand for electricity. Reports, including the World Bank's assessment of residential power consumption, have shown that approximately 40% of energy is used for cooling. This emphasizes the significant environmental impact of Heating, Ventilation, and Air Conditioning (HVAC) systems. To address this challenge, we propose a practical and sustainable solution using Phase Change Materials (PCMs) for cooling. PCMs, widely used in thermal energy storage (TES) in building construction, provide an innovative way to balance energy demand and supply efficiently. The research aims to improve indoor air temperatures and reduce thermal energy demand by introducing a PCM-based supplementary layer into composite walls, resulting in a substantial 16% reduction in cooling demand. This represents a significant step toward embracing sustainable, energy-efficient practices in building design and construction.

Key words: Phase Change Materials (PCMs), Building Insulation, Energy Efficiency, Thermal Energy Storage (TES), HVAC Systems, Global Warming, Sustainable Building Design

1. INTRODUCTION

In the last two decades, Phase-Change Materials (PCMs) have emerged as crucial components in the pursuit of energy-efficient solutions for building design and thermal management. Against the backdrop of a substantial surge in carbon dioxide (CO2) emissions, with buildings alone contributing to roughly 36% of greenhouse gas emissions related to climate change, the urgency to mitigate energy consumption and its environmental consequences has become increasingly evident [1]. Escalating energy costs have driven researchers worldwide to explore novel materials capable of alleviating the ever-growing demand for power, of particular concern is the rising energy consumption associated with heating and cooling systems, which are indispensable for maintaining thermal comfort in buildings [1]. Addressing this challenge is of paramount importance for enhancing building energy efficiency. However, it is essential to acknowledge that existing structures, which constitute a significant portion of our built environment, cannot be overlooked in this pursuit. An innovative approach to reducing energy demand involves thermal energy storage (TES), a technology capable of absorbing, storing, and releasing heat in response to prevailing environmental conditions [2]. Within this domain, latent heat thermal energy storage (LHTES) has garnered significant attention in recent years, with PCMs emerging as a pivotal choice due to their distinctive thermophysical properties, including a well-defined melting point range, heat of fusion, thermal conductivity, and density [1]. Additionally, PCMs offer compatibility with construction materials, chemical stability, recyclability, and the potential to reduce the size of Heating, Ventilation, and Air Conditioning (HVAC) systems [1]. One innovative approach to enhancing the heat conductivity of PCMs, without compromising their energy storage capacity, involves the use of composite materials featuring aluminum lattices that accommodate the PCM and graphite [1]. This design mitigates volume changes in paraffin and reduces subcooling in hydrated salts, resulting in notably enhanced thermal conductivity, with a remarkable 9% latent heat of fusion per unit mass of paraffin [1]. The significance of thermal mass in buildings cannot

Analysis and implementation of FACTS devices on a transmission line

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Abstract : Due to the dynamic nature of the electric power system and the significant increase in non-linear loads, excellent power quality is a significant challenge. To enhance its performance, it is thus necessary to limit these disruptions and minimize. The power quality results are directed. In the 22 kV examination, a three stage, three wire transmission framework was connected to the MATLAB climate utilizing the UPFC's phasor model. This study examines the exhibition and control of UPFC that will be introduced on a transmission line. Results from recreations exhibit how well UPFC controls genuine and receptive power moving through the line.to the dynamic nature of the electric power system and the significant increase in non-linear loads, excellent power quality is a significant challenge. To enhance its performance, it is thus necessary to limit these disruptions and minimize three wire transmission frameworks connected to the MATLAB climate utilizing the UPFC's phasor model. This study examines the exhibition and control of UPFC that will be introduced on a transmission line.

Keywords : Power Quality, Harmonic, UPFC,

1. Introduction

All over the planet, the development of power structure utilities has advanced quickly, with enormous mechanical degrees of progress and movements in the arrangement and action transmission, and flow structures is normal in light of the consistent mechanical movements. Purchasers of energy at all levels of use put a creating proportion of importance on the issue of power quality. Both the cutting edge and home circumstances as frequently as conceivable contain, which has incited a creating stress over, huge motor starting, introduced age, fragile stuff, storms, and various factors are the essential drivers of issues that could impact the idea of the power environmental naughtiness, network hardware, and plan. Exactly when creation processes become more confounded and demand a higher obligation level, which integrates targets like giving energy without impedance, without consonant winding, and with strain rule between uncommonly flimsy edges [1].

To sustain the dependability of the power structure, the majority of the in emerging nations with colossal, associated making saves. Regardless, as enormous associated networks ended up being more tangled, the consistency of the power supply changed, provoking system dubiousness, inconvenience controlling the power stream, and security gives that provoked different blackouts in various locale of the world. The recently referenced weakness progressions could have happened owing to orchestrate over-trouble, lacking power system affiliations, nonattendance of upkeep, or central issues in orchestrating and movement. Foundation of new transmission lines is critical to avoid these effects, supply the right power stream, and assurance the relentlessness and consistency of the structure. Anyway, the colossal, associated power system confines the foundation of additional transmission lines on account of things like money related cost and ecological worries. The difficulty of adding additional transmission lines to a power structure powers power experts to investigate procedures for extending power stream through an ongoing transmission line without compromising the dauntlessness and security of the system [2].

A Comprehensive Review of Haptic Technology and its Applications

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Abstract: Haptic technology enables people to connect with digital worlds through touch by giving them tactile feedback. With the aid of this technology, it is possible to create virtual objects that can be realistically and easily touched, moved, and altered. Numerous industries, such as gaming, medical education, prosthetics, and industrial automation, use haptic technology. In order to provide a variety of tactile sensations, including pressure, texture, and temperature, the technology uses sensors, actuators, and software. Haptic technology is poised to dramatically alter how we engage with digital surroundings as it develops, creating new opportunities for immersive experiences and improved human-machine interactions

Keywords: Tactile feedback, force feedback, Haptic Technology, Virtual touch, Tactile Rendering

1.   Introduction   A field of technology known as haptic technology uses force feedback and tactile feedback to provide people an immersive experience. In order to give users a more realistic experience, it is typically employed in virtual reality systems and gaming gadgets. Haptic feedback is produced by a variety of sensors and actuators that are made to react to various stimuli.

Although the technology has been present for a while, it has recently become more widely used as a result of the rising use of virtual reality systems and the interest in immersive experiences. In the upcoming years, the market for haptic technology is anticipated to expand significantly due to the advent of new applications and the growing acceptance of haptic technology.

The ability to improve the user's sensation of presence and interaction with a virtual environment or object is one of the main advantages of haptic technology. Users can have a more realistic experience by using force feedback and tactile sensations, which give them the impression that they are physically interacting with the virtual world. Applications like training simulations, medical operations, and gaming can all benefit from this.

Accessibility and assistive technology both benefit from haptic technology. Tactile feedback, for instance, can be utilized to aid users with motor disabilities in navigating interfaces and gadgets or to offer cues for the blind. Actuators are used in haptic to exert forces on the skin in order to provide touch feedback and controllers. Mechanical motion is produced via electrical stimuli. A vibratory motor was one of the electromagnetic technologies used in the initial generation of haptic feedback. Resonance frequency is how these motors work. But there are only a few sensations, which is the limitation. Additionally, the device vibrates as a whole rather than individually, which reduces the possible reactions. The haptic could be localized to a point on the screen thanks to the second generation devices' usage of touch coordinate-specific responses. Piezoelectric crystals and electro active polymers were used in these gadgets. These enable a significant haptic reaction with respect to frequency, timing, and intensity. Even the response time has been cut in half, going from 35 to 15 milliseconds. The third generation offers fully customized touch coordinate specific responses. Control chips with low latency have been employed. Customization of electrostatic haptic and audio is possible because to this technology. Even reverse electro vibration has been employed, in which a weak current from the tool to the user interacts with an oscillating electric field surrounding the skin on the finger tips to produce a feeling effect. The fourth generation integrates pressure sensitivity and the most cutting-edge haptic technology concepts, allowing the response effect to be proportional to the amount of pressure applied. Recently, KDDI and Kyocera have been developing this technology.

1.1 Concept of Haptic Technology

The fundamental parts that make up the haptic technology system include a real-time algorithm, a

A Brief Review of Charging Station Topologies for Electric Vehicles

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Abstract: Over the next few years, electric vehicles are expected to play a major role in the transportation industry. Therefore, it is important to design the charging infrastructure concurrently. This paper presents the many methods and tactics for electric vehicle charging systems. This page covers fast charging stations with solar PV integration, charging stations based on predictive controllers, PV-assisted EV fast charging stations, MPPT Algorithms for Solar PV based Charging Stations, and EV charging stations based on multiport converters. Future researchers and students who are interested in developing solar-powered quick charging stations for electric vehicle design will find this study useful.

Keywords – Electric Vehicle, Charging Station, Fast Charging, MPPT.

1. Introduction

Electric vehicles (EVs) have grown in popularity over the last ten years. Demand is increasing due to the steadily declining supply of fossil fuels such as crude oil, coal, natural gas, and heavy oil, which are sought after by the growing populations of industrialized and developing countries [1]. Due to ongoing efforts and innovative research projects in the Battery Management System (BMS) for applications in EVs, electric cars have evolved into a class that is further separated into hybrid electric vehicles (HEVs)2 and plug-in hybrid electric vehicles (PHEVs)3. PHEVs are definitely more popular than HEVs, despite the fact that they make up the bulk of EVs presently on the market. This is due to the flexible fuel options offered by these vehicles, which can operate on both conventional fuels like gasoline and oil as well as electric power stored in a battery (energy storage device).

Depending on where and when an EV is charging, several charging techniques are used. The ability to charge at work or at public charging stations should be taken into account when buying an electric car, according to a study on electric cars by (Accenture 2011). The infrastructure for DC quick charging is presently being built by certain significant manufacturers, such as Nissan and Tesla. This rapid charging infrastructure eliminates "range anxiety" among EV users by enabling an EV to be charged more quickly than with a normal charger. The continual worry that the battery may run out of power while driving an electric vehicle and leave it stranded is known as range anxiety (Blanco 2010). Some business owners are placing charging stations with complimentary charging options close to their showrooms or retail establishments in an effort to draw in a larger customer base. One of the EV producers that is significantly progressing in this area is Tesla.

In this text, "electric vehicle" is a catch-all term for any kind of motorized transportation that utilizes rechargeable batteries, including automobiles, buses, motorcycles, and trucks. Increased grid power usage is a new issue brought on by the growth in the number of electric vehicles. One efficient strategy to reduce the consequences is to decentralize power production, for example, by integrating local renewable energy sources into charging infrastructure. In the context of smart grid technologies to solve this issue, Liu et al. [2] discuss the relationship between renewable energy and issues with EV charging.

2. Different Scenarios of Charging EVs

There can be four different scenarios for charging of EVs.

2.1 Uncontrolled Charging or the end-of-travel charging:

This is a typical charging setup for an electric car that is parked at home. To manage how and when charging occurs, no complicated control technology is needed. Additionally, it doesn't provide any data on user behavior or incentives, including time of use rates (ToU). A constant charging rate of 1.4 kilo Watt (kW) is considered for this application based on a typical household 110/120 volt 20 Ampere circuit with a continuous rating of 1.8-2.0 kW. A completely charged battery takes around six hours to

A review of IoT in Agriculture: Opportunities, Challenges, and Benefits for Farmers

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Abstract: A crucial occupation vital to human survival, modern agriculture can benefit significantly from the implementation of the Internet of Things (IoT) for sustainable water management. This technology offers the potential to monitor and regulate water resources effectively across various industries. By integrating IoT in agriculture, it becomes feasible to boost agricultural yield and streamline water usage. This study investigates the application of IoT for water management in agriculture, a critical issue for farmers worldwide. The research underscores current IoT-based strategies for water management in agriculture, including the deployment of sensors and monitoring technologies such as automation systems, remote sensing, and in-field sensing. The study elaborates on how IoT facilitates real-time monitoring of water consumption for farmers, optimizing water conservation through the implementation of irrigation schedules and providing recommendations regarding the timing and volume of water required for crop irrigation.

Keywords: Internet of Things (IoT), Sustainable agriculture, water management

1. Introduction

The world's expanding population has an increasing need for food, and agriculture is a key sector of the economy in many areas across numerous continents. An essential part of economic development is agriculture. Agricultural activities must consider ecological and environmental limits in order to meet these objectives. While ensuring ideal and pure water conservation, it is very important to prevent rapid land deterioration. Even the Food and Agriculture Organization of the United Nations (FAO) stresses the importance of developing a modern agriculture policy that preserves, protects, and promotes natural resources while also guaranteeing the protection of human health. In general, significant efforts are needed to enhance agricultural areas like forestry, animal husbandry, and crop production in order to meet the world's food need. However, water is a natural resource that is essential for supplying the aforementioned nutritional requirements. It has a crucial role in the growth of plants and is particularly significant in the sector of agriculture.

The goal is to intelligently classify, locate, track, supervise, and control agricultural activities and objects. The "Human-Machine" connectivity of agricultural IoT enables more sophisticated and dynamic discovery, management, and control of many agricultural aspects, processes, and systems. Additionally, it substantially increases our ability to manage complex agricultural systems and helps us deal with agricultural emergencies.

Hilly Highways Accident Alert System

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Abstract: India is an emerging country in terms of infrastructure Development. With this development, the problem of accidents has increased tremendously. This study has been undertaken to investigate the functioning of a self-sustained multi-powered Accident Alert System particularly aimed at reducing accidents in hilly regions. The proposed system is powered by renewable energy i.e. wind and solar power.

Keywords – **Renewable Energy, Wind Power, Solar Power**

I. INTRODUCTION

Nowadays, many accidents occur in Hilly Ghat areas. Accidents occur due to the vehicle not being able to recognize the other vehicle coming from the opposite side and when suddenly a vehicle comes in front, drivers are not able to control the speed of the vehicle, and hence accident results in accidents. Such accidents result in a great loss of life. Also due to accidents, losses of money as well as loss of life results. Last year in India deaths were over 1.51 Lakh, and in Maharashtra, total accidents were 11870. This accident affects the economy of the country, affects transportation, and causes too many loss of lives. On curved roads accidents happen because the driver is not able to recognize vehicles coming from opposite sides. So to avoid such incidents we have come up with the idea of a "Multi powered accident alert system for hilly highways". Here we developed a circuit by which when a vehicle or obstacle on the opposite side is detected the IR module senses it and sends the signal to the transistor (triggering circuit) then the transistor switches on the supply of buzzer and glows a red LED and at the same time buzzer produce sound to alert the driver. The same execution of the system happens on another side of the curved road. Now, when E vehicles are used all over India, Charging Stations will be required. In those areas, Power loss occurs a lot. Hence we can provide charging stations at the start and end of Ghat, by Installation of solar panels and wind turbines and using their generated energy to charge the charging station. Now because A large amount of solar rays strikes hilly areas, the same solar rays can be used to generate energy using solar panels. Also, wind is being wasted in abundant amounts in hilly areas. These winds can be brought into use by installing wind turbines, and hence power generated by solar panels and wind turbines can be used to power the charging station by making it a hybrid system. The main aim of this paper is to avoid accidents on the curved road. Here solar power and wind power are used for powering the charging station. The energy obtained by solar panels and wind turbines will be used to power the charging station. By Application of this project in a hilly area loss of lives will be reduced, and thousands of lives will be saved, this project is fully automated and hence doesn't require any operator, it provides a safe journey to passengers, energy will be generated without any pollution of air, water or noise.

II. PROBLEM IDENTIFICATION

At hilly ghat areas in curve roads, accidents occur in great numbers, and due to no solution to the prevention of accidents at hilly ghat areas in curve roads, accidents are not reducing but increasing day by day. This accident occurs because, in curved roads or U-shaped roads, drivers are not able to recognize or see the vehicles or objects on the other side of the road due to the obstacle in between. Hence due to this above reason accident occurs in hilly areas ghat region on curved roads or pin-shaped roads. Last Year in India total number of deaths that occurred was over 1.51 lakh, and the total number of accidents that occurred in Maharashtra was 11,870. This accident resulted in great loss of lives and not only loss of lives but also affected the economy of the country, and transportation over that road, and caused much other damage. Now, to avoid all these severe losses, like loss of lives, disturbing the transport facility, and affecting the economy of the country we have to build a system in which the driver on hilly ghat areas at curve roads or U-shaped roads must be able to recognize the vehicle coming from the opposite side.

Fig.1 Ghat Crossing

A Hybrid Solar -Wind Power Generation System : Challenges and Prospects

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[1,2]Electrical Engineering Department,
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Abstract : The extension of the grid cannot currently reach the rural areas where there are no electrified residents since the link is not economically viable nor supported by the major players. Additionally, conventional energy options, such fuel-based systems, are gradually being dropped from rural development agendas due to the rise in oil costs and the intolerable effects this energy source has on its consumers and the environment. Using "hybrid power generation using solar and wind energy," this issue can be solved.

IndexTerms – **Solar Energy , Wind Energy , Converters**

I. INTRODUCTION

Many are looking at sustainable energy alternatives to protect the planet for future generations as worry over global warming and the depletion of fossil fuel supplies grows. Other than hydropower, solar and wind energy have the most potential to satiate our energy needs. Wind energy is capable of producing significant amounts of electricity when used alone, but it is highly unpredictable because it might appear one minute and disappear the next. Similar to this, solar energy is there all day long, but the amount of solar irradiation varies due to the sun's intensity and the unpredictability of the shadows created by clouds, birds, trees, etc. Both wind and photovoltaic systems have the inherent flaw of being intermittent, which renders them unstable. Nevertheless, by merging these two sporadic sources and by The efficiency and dependability of the system's power transfer can be greatly increased by using multi-phase power tracking (MPPT) algorithms [1-2]. The alternative energy source can make up the difference if one source is unavailable or not enough to fulfil the demands of the load. There have been numerous hybrid wind/PV power systems proposed and explored in works. To perform MPPT control for each of the renewable energy power sources, the majority of the systems described in the literature use a separate DC/DC boost converter coupled in parallel in the rectifier stage. It has been recommended to use a more straightforward multi-input structure to combine the sources from the DC-end and yet achieve MPPT for each renewable energy source. The suggested construction combines the buck and buck boost converters. Systems described in the literature need passive input filters [3-4].

II. SOLAR WORKING PRINCIPLE

To understand how solar panels transform solar energy into electrical energy, we also need to understand how solar cells function. The devices that convert solar energy into electrical energy by utilising the photovoltaic effect are known as solar cells or solar photovoltaic cells. Numerous real-time applications, including remote telecommunication systems, street lighting systems, residential lighting systems, and railway signalling systems, utilise these cells. A silicon P-type layer that is in contact with a silicon N-type layer makes up a solar photovoltaic cell. The N-type substance's electrons permeate into the P- type material. The N-type material has more electrons than the P-type material does because its holes can accommodate more electrons. In light of the sun energy's influence, these As a result, the P-N junction is where these electrons and holes combine. This combination results in the creation of a charge and an electric field on either side of the P-N junction. This development of an electric field leads to the creation of a system that resembles a diode and encourages charge flow. This is known as drift current, and it balances the diffusion of electrons and holes. The depletion zone, also known as the space charge region, is where this drift current occurs since it lacks mobile charge carriers there. Thus, these solar photovoltaic cells operate as reverse bias diodes at night or in complete darkness. In most cases, the voltage of a solar panel's open circuit (when the battery is not attached) is higher than the voltage of the panel itself. Consider a 12 volt solar panel, for instance, which, in good sunlight, may provide an output voltage of roughly 20 volts. However, once a battery is connected to the solar panel, the voltage lowers to 14 to 15 volts. Silicon and other commonly used semiconductor materials are utilised to make solar cells. An array of solar panels is used in the solar photovoltaic (SPV) effect, a process that transforms solar energy into DC electricity. Battery storage, direct DC load feeding, or indirect AC load feeding are all possible uses for this DC electricity. with the use of an inverter that converts DC power to 120-volt AC power [3].

III. WORKING OF WIND POWER PLANT

One of the renewable energy sources, wind energy, can be used to power generators and wind turbines to produce electricity. There are several benefits to employing wind energy, including the ability to generate electricity with wind turbines, generate mechanical power with windmills, pump water with wind pumps, and more. Electricity can be produced as a result of the large wind turbines rotating with the wind. When a generator is connected to the electricity grid, the minimum wind speed required is known as the cut in speed, and when it is disconnected from the grid, the highest wind speed required is known as the cut off speed. Typically, wind turbines operate in the speed range between the cut-in and cut-off speeds [5-6].

A Hybrid Solar -Wind Power Generation System : Challenges and Prospects

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Abstract :   The extension of the grid cannot currently reach the rural areas where there are no electrified residents since the link is not economically viable nor supported by the major players. Additionally, conventional energy options, such fuel-based systems, are gradually being dropped from rural development agendas due to the rise in oil costs and the intolerable effects this energy source has on its consumers and the environment. Using "hybrid power generation using solar and wind energy," this issue can be solved.

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Many are looking at sustainable energy alternatives to protect the planet for future generations as worry over global warming and the depletion of fossil fuel supplies grows. Other than hydropower, solar and wind energy have the most potential to satiate our energy needs. Wind energy is capable of producing significant amounts of electricity when used alone, but it is highly unpredictable because it might appear one minute and disappear the next. Similar to this, solar energy is there all day long, but the amount of solar irradiation varies due to the sun's intensity and the unpredictability of the shadows created by clouds, birds, trees, etc. Both wind and photovoltaic systems have the inherent flaw of being intermittent, which renders them unstable. Nevertheless, by merging these two sporadic sources and by The efficiency and dependability of the system's power transfer can be greatly increased by using multi-phase power tracking (MPPT) algorithms [1-2]. The alternative energy source can make up the difference if one source is unavailable or not enough to fulfil the demands of the load. There have been numerous hybrid wind/PV power systems proposed and explored in works. To perform MPPT control for each of the renewable energy power sources, the majority of the systems described in the literature use a separate DC/DC boost converter coupled in parallel in the rectifier stage. It has been recommended to use a more straightforward multi-input structure to combine the sources from the DC-end and yet achieve MPPT for each renewable energy source. The suggested construction combines the buck and buck boost converters. Systems described in the literature need passive input filters [3-4].

II. SOLAR WORKING PRINCIPLE

To understand how solar panels transform solar energy into electrical energy, we also need to understand how solar cells function. The devices that convert solar energy into electrical energy by utilising the photovoltaic effect are known as solar cells or solar photovoltaic cells. Numerous real-time applications, including remote telecommunication systems, street lighting systems, residential lighting systems, and railway signalling systems, utilise these cells. A silicon P-type layer that is in contact with a silicon N-type layer makes up a solar photovoltaic cell. The N-type substance's electrons permeate into the P- type material. The N-type material has more electrons than the P-type material does because its holes can accommodate more electrons. In light of the sun energy's influence, these As a result, the P-N junction is where these electrons and holes combine. This combination results in the creation of a charge and an electric field on either side of the P-N junction. This development of an electric field leads to the creation of a system that resembles a diode and encourages charge flow. This is known as drift current, and it balances the diffusion of electrons and holes. The depletion zone, also known as the space charge region, is where this drift current occurs since it lacks mobile charge carriers there. Thus, these solar photovoltaic cells operate as reverse bias diodes at night or in complete darkness. In most cases, the voltage of a solar panel's open circuit (when the battery is not attached) is higher than the voltage of the panel itself. Consider a 12 volt solar panel, for instance, which, in good sunlight, may provide an output voltage of roughly 20 volts. However, once a battery is connected to the solar panel, the voltage lowers to 14 to 15 volts. Silicon and other commonly used semiconductor materials are utilised to make solar cells. An array of solar panels is used in the solar photovoltaic (SPV) effect, a process that transforms solar energy into DC electricity. Battery storage, direct DC load feeding, or indirect AC load feeding are all possible uses for this DC electricity. with the use of an inverter that converts DC power to 120-volt AC power [3].

III. WORKING OF WIND POWER PLANT

One of the renewable energy sources, wind energy, can be used to power generators and wind turbines to produce electricity. There are several benefits to employing wind energy, including the ability to generate electricity with wind turbines, generate mechanical power with windmills, pump water with wind pumps, and more. Electricity can be produced as a result of the large wind turbines rotating with the wind. When a generator is connected to the electricity grid, the minimum wind speed required is known as the cut in speed, and when it is disconnected from the grid, the highest wind speed required is known as the cut off speed. Typically, wind turbines operate in the speed range between the cut-in and cut-off speeds [5-6].

Rechargeable Li-Ion Based Electrical Vehicle

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Abstract: This Fully electric vehicles are being introduced to the passenger car market in addition to the already popular hybrid vehicles. There are existing and proposed standards for the design of these vehicles to reduce the risk of occupants and rescue personnel being exposed to hazards such as corrosive chemicals, toxic fumes, fire and electric shock in the event of a crash. Some manufacturers are understood to be working with rescue organizations to develop appropriate procedures for dealing with these crashes. No problems with the electrical systems or batteries were encountered. Lithium-ion batteries are becoming popular and these might introduce different hazards for crash- test and rescue personnel.

IndexTerms – **Electrical Vehicle, Efficiency, Renewable energy sources**

I. INTRODUCTION

An electric motor forces an electric vehicle (EV) as opposed to an internal combustion engine and it can generate power by burning a mixture of fuel and gases. So, to resolve the problem like increasing pollution and climate change. The deterioration of natural resources, so electric cars is considered as an alternative for present day vehicle industry. The idea of electric cars is not new, it has been center of attraction since the last decade because of increasing carbon emissions, which is causing dangerous effects on environment. Figure 1. General appearance of introduction to EVs.

Figure 1. Introduction to EV

In 2010, India made its first official move to uplift the usage of electrical cars. The Indian Ministry of New and Renewable Energy (MNRE) authorized a Rs 100 crore programme, and the government offered a financial subsidies for makers of electric cars sold in India. The programme, which went into effect in November 2010, called for subsidies of up to 15% on automobile old-factory pricing, based on maximum. The Ministry later withdrew the allowance programme, though, in April 2012.

In an effort to undertake a sizable transition to electric powered vehicle & to solve problems with to countrywide power safety, automobile pollution & the enlargement of nearby manufacturing competencies India provided the countrywide electric powered mobility project plan 2017 in 2013.Arun Jaitley, who was the finance minister at the time introduced quicker adoption & production electrical vehicle(fame), with an prelimnary outlay of Rs 65 crore, throughout the presentation of the union budget for 2015 within the Parliament.

II. LITERATURE REVIEW

B. Song et al. [1] discusses recent electric vehicle technology with battery has faced many problems: high cost, weight, driving distance, long charging time and danger of electric shock. An inductive power transfer pickup for electric vehicles such as pickup of traditional transformer enables electric vehicles to overcome these problems by using contactless power transfer. Also, inductive power transfer pickup has many advantages including high efficiency, high power, a large air gap and lightweight. In this paper, proposed inductive power pickup was developed using series capacitor with ferrite cores and multi-windings and was tested for its ability to transfer electricity wirelessly. When tested for output power and efficiency of pickup, output power of 20kW and efficiency of 86.7% were achieved at 20 kHz and 250mm air gap.

V. Sreedhar [2] discusses, with increasing concern over the environment and ever- stringent emissions regulations, the electric vehicle has been investigated as an alternative form of transportation. However, the electric vehicle suffers from relatively short range and long charging times and consequently has not become an acceptable solution to the automotive consumer. The addition of an internal combustion engine to extend the range of the electric vehicle is one method of exploiting the high efficiency and lack of emissions of the electric vehicle while retaining the range and convenient refueling times of a conventional gasoline powered vehicle.

B. Frieske, M. Kloezke and F. Mauser [3] discusses the state-of-the-art and trends in vehicle concept as well as key technology development in the context of electric mobility in a time frame from 2002 until 2012. Thus, an extensive vehicle concept database was designed, covering detailed technical specifications of more than 200 electrified vehicles in 3 different world regions, also considering different stages in vehicle development. By analyzing and comparing over 75 different market- and technology-

DESIGN ANALYSIS AND OPTIMIZATION OF CRANE PLATFORM BASE ON COMPOSITE STRUCTURAL SANDWICH PLATE

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ABSTRACT:

The demand has increased for various types of load carrying platforms and panels for various applications. Applications include various types of lifts, crane loading platforms, areal access platforms etc. The idea behind sandwich panel is to produce efficient panel to support the load of an object at minimum weight at reasonable cost. First we can reduce the weight of the material thereby reducing the cost of the material. However the cost of manufacturing may increase, thereby offsetting some part of the benefit which we have obtained by reduction of weight. Secondly, when we lift material by using platform, support structure carries the load of the platform in addition to the actual load on platform. This makes the support structure heavier and also requires heavier capacity of drive system thereby increasing overall cost. Or, if we use lighter platform then with same drive system and support system we can go for more actual load. This makes the design of such low weight panels is advantageous. A structural sandwich consists of two thin face sheets made from stiff and strong relatively mild steel material welded to a thick light weight material called core made up of same material. This construction has often used in lightweight applications such as aircrafts, marine applications and wind turbine blades.

Keywords: Composite Structural Sandwich Plate, Design Analysis and Optimization of Industrial Crane Platform Base.

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Planning and Development of a Green Highway in India with a Focus on Sustainability

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Abstract: In addition to the building industry, several other sectors also apply sustainable development principles. The construction and upkeep of infrastructure, such as roadways, will significantly support the goal of sustainable development. The bulk of conventional highways are unsustainable in several ways, according to earlier research. Roads have many challenges, including deteriorating conditions, traffic, energy availability, and a lack of financing for upkeep and capacity expansion to meet rising demand. However, they also use an enormous amount of energy and natural materials, produce trash, and emit emissions that contribute to global warming. As a result, current priorities include sustainable design, construction, operation, and maintenance. Since green highway technology was created in the United States in 2002, public non-public engagement is referred to as the "Green Highway Partnership" when advocating for it in this nation. The Indian government created the Green Highway Policy in 2015. With the help of farmers, the private sector, and government organizations like the Forest Department, this policy promotes greening and the building of environmentally suitable national route corridors across the nation. This study reviews green highway design and construction options with an emphasis on Indian cities. The conventional highway will be transformed into a green highway immediately out of the gate, with the necessary modifications made during the building and upkeep stages. Prior to the development of common features for green highway technology, it is always beneficial to understand the green highway practices that should be applied to the entire process of designing, building, and maintaining highways. Another important point to remember is that the Green Highway Initiative is a voluntary social group that consists of various government agencies from the Environmental and Ecological Department, various involved sections, social establishments, labor unions, private contractors, and other parties helpful in carrying out the Green Highway's social objectives.

Index Terms - **Green highway, Sustainable design and construction, Green Highway Policy.**

I.   INTRODUCTION

   sustainable development plan in the previous ten years. Sustainable issues have received a lot of attention lately, especially in the building industry. As a result of growing populations, sustainable development may be essential to achieving both environmental goals and the demand for large-scale infrastructure. One of the things that will usually lessen the effects of the major road on the atmosphere is property style. (Constandopoulos et al., 2013) The effects of building and vehicle emissions include noise, ground and pollution, disruption of the environment, land usage, air, temperature changes, vibration, and contamination of plants and wildlife. (Griffith A et al.,2009) Road, parking, and other facility development and management frequently purposefully alter the impact. The purpose of the Green Highway classification system was to determine how green and environmentally friendly a given highway was. Because they cut through the terrain, roadways have both a starting and a linear impact.

        The US adopted a classification system and phrase for green highways in 2005. This voluntary third-party road project classification system aims to recognize and honor highway projects that outperform public expectations in terms of environmental, economic, and social performance. (WISE. Green roads Manual V1.5. ,2011) Property style becomes one of the most important requirements for granting credit in the classification system in order to maintain or sustain long-term responsibility. (McLennan. F, 2004) The green highway rating system was established by Washington Internship for Students Engineering (WISE). A roadway that is both environmentally and economically sustainable can be developed and classified using the rating system, which verifies that the design is sustainable, friendly to the environment, and causes the least amount of environmental harm. (WISE. Green roads Manual V1.5., 2011). To lessen the impact of highways on the environment, advanced designing, intelligent building, transport systems, and maintenance techniques have been included into modern highway design. These days, a popular method for confirming a building's environmental

Development of Smart Bot Application

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Abstract

This paper presents a cutting-edge smart bot designed for web deployment, focusing on its applicability within the digital landscape of educational institutions. This adaptable digital entity extends its reach beyond a single website, engaging with various communication and social media platforms. While chatbots have found effectiveness in domains like healthcare, this research explores their untapped potential in diverse educational contexts. The COVID-19 pandemic's global impact underscores the urgency of digital solutions in education. Chatbots offer a means to secure students' academic progress and enrich their learning experiences. This paper examines the myriad applications of chatbots in education, highlighting their capacity to fortify the educational landscape. Chatbots facilitate seamless interactions through text or voice, providing instant responses sourced from a cloud-based database hosted on Microsoft Azure. This innovation addresses the growing demand for technology-driven solutions and a virtual representative platform, saving time and effort for educational institutions and knowledge seekers. It aligns with the evolving digital education landscape, serving as a mutually beneficial asset for both. This research showcases the potential of chatbots to enhance educational experiences, presenting opportunities for further exploration and customization in the dynamic field of digital education.

Keywords: Smart Bot, Artificial Intelligence, Machine Learning, Chatbots. Communication, Microsoft cognitive service, QnA maker, Microsoft Azure cloud computing, Power Automate, Python SDK

1. INTRODUCTION

In an era characterized by digital interconnectedness, the emergence of smart bots has rapidly assumed a pivotal role in a diverse range of applications, with a particular emphasis on their significance within the realm of educational institutions [1]. These virtual entities, seamlessly integrated into the web infrastructure of educational websites, transcend geographical boundaries and provide unparalleled portability and shareability across a myriad of communication and social media platforms [2]. From WhatsApp to Telegram, LinkedIn to Instagram, and numerous other platforms, the transformative potential of smart bots in redefining information access and interaction is unmistakable. This research project is fundamentally driven by the ambition to nurture a conversational bot endowed with advanced artificial intelligence and machine learning capabilities [3]. Such a bot would excel in engaging users in nuanced dialogues while fulfilling their information and data requirements. The focus of our research is distinctly oriented toward the educational sector, where the imperative to cater to the information needs of students, faculty, and parents is harmoniously aligned with the broader objective of optimizing the overall learning experience.

The catalyst for this initiative lies in recognizing that chatbots offer an efficient means of fostering transparent and user-friendly communication that transcends linguistic barriers, accommodating languages as diverse as English, Hindi, and Marathi. Within the context of educational institutions, envision a scenario where students can seamlessly turn to website-based chatbots for immediate and comprehensive responses to their inquiries, eliminating the need for physical visits to administrative offices or authorities. College websites enhanced with these intelligent bots have the potential to facilitate streamlined communication among various departments, thereby nurturing an environment conducive to innovative problem-solving. The end-user experience is characterized by the ease of engaging in seamless textual and voice-based interactions. Within this dynamic conversational landscape, a vast reservoir of information is readily accessible from a meticulously curated cloud-based database hosted on Microsoft Azure's data storage infrastructure. The utility of this technology extends across various dimensions [4]: Students and Parents: Access to critical information, including admission procedures, academic calendars, curriculum details, timetables, and academic results. Management, Faculty, and Teaching-Learning Processes: Valuable insights into the institute's administrative dynamics and the educational journey. Placement and Internship Data: A comprehensive repository of on-campus and off-campus recruiting companies, job placements, internship opportunities, company details, and compensation packages. Educational Resources: Availability of a rich array of teaching

Development of a Language Translation & Language Understanding Model Using Machine Learning

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Abstract

In our increasingly globalized world, language serves as a bridge for human interaction but also poses significant obstacles. The diversity of global languages, particularly in regions like India, challenges digital literacy due to uneven access. This research introduces an innovative approach to foster digital inclusion, aligning with the "Digital India" initiative. Our primary goal is to leverage Machine Learning for advanced Language Translation and Understanding Models. Translation, as the process of encoding and decoding information, becomes particularly challenging for less explored language pairs such as Marathi and English or Hindi and English. While achieving perfect translation remains elusive, Machine Translation aims to provide comprehensible interpretations. Our focus lies in developing Machine Translation systems tailored for low-resource language pairs, specifically the English-Marathi language pair, in both translation directions. In the initial phase, we utilize provided parallel training data within specific constraints. In the subsequent phase, we expand our horizons by incorporating parallel corpora from various sources to address English-Marathi and English-Hindi translations, maximizing our Machine Translation capabilities. Sitting at the intersection of Machine Translation and Natural Language Processing, this research offers a transformative path to bridge linguistic divides, foster digital inclusion, and create a brighter future for India's diverse linguistic landscape.

Keywords: Machine Learning, Machine Translation, Natural Language Processing (NLP), HTML, Tailwind CSS, React.Js, Python, Flask, Jinja2, Azure Translator & Speech API, Azure CognitiveServices, NLTK (Natural Language Toolkit) , Microsoft Azure, Prisma, TensorFlow.

1. INTRODUCTION

2. In our increasingly interconnected world, language stands as the foremost conduit for human interaction, reflecting the sheer diversity of human expression and posing complex challenges [3]. With an intricate tapestry of languages spoken and written across the globe, the barrier to digital literacy becomes pronounced, especially in regions like India, marked by linguistic diversity and uneven access to digital resources [1]. This research endeavors to introduce an innovative solution that transcends language barriers and aligns with the "Digital India" initiative. Translation serves as the essential bridge between people speaking different languages, a process that encodes information from one language and decodes it into another, adhering to the target language's rules. While attempts have been made to automate this process for various language pairs, challenges persist, and the accuracy, particularly for regional languages like Marathi and Hindi, remains a subject of exploration [2]. Machine Translation strives to provide comprehensible interpretations, even if they may occasionally exhibit slight imperfections. This research project focuses on the development of Machine Translation systems, specifically tailored for low-resource language pairs, with a primary focus on the English-Marathi language pair in both translation directions. The study unfolds in two phases: one constrained, leveraging provided parallel training data, and another unconstrained, utilizing parallel corpora from diverse sources for English-Marathi and English-Hindi translations.

Positioned at the intersection of Machine Translation and Natural Language Processing (NLP), this research contributes to bridging linguistic divides, fostering digital inclusion, and supporting the vibrant linguistic diversity of India [3]. The challenges in translating Marathi to English are distinctive, encompassing both syntactic and morphological differences, underlining the necessity for a rule-based machine translation system [4]. This work seeks to address these challenges while promoting broader accessibility to the Marathi language, thereby enhancing global communication and knowledge sharing. In a world where English