2022 - 2023

Publication

Details

Sl.No	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Type	Year of publication	Month	ISSN number	Link to website of the Journal	Link to article/paper/abstract of the article	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	Synthesis, characterization and non-isothermal degradation kinetics of rose Bengal end capped poly(aniline)/Cr2O3 nanocomposite	Kenet Nancy Mary M., Jancirani A., **Baskaran R.**, Anbarasan R.	BT	Chemical Papers	Article	2023	Augest	3666352	https://www.springer.com/journal/11696	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85167827350&doi=10.1007%2fs11696-023-03015-8&partnerID=40&md5=448ce52d82b9d97c537e5454b60ce8fc	Scopus
2	Microwave Assisted Extraction of Polyphenols from Pithecellobium dulce Benth Fruit Peels and Evaluation of its Anticancer and Antioxidant Activity	**Murugesan, Selvakumar**, Maran P., Venkatesan M., **Alexander, Ronaldo Anuf**	BT	Waste and Biomass Valorization	Article	2023	June	18772641	https://www.springer.com/journal/12649	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85162988706&doi=10.1007%2fs12649-023-02183-8&partnerID=40&md5=473807dcf6390afbca24e6a845ea598a	Scopus
3	Evaluation of wound healing active principles in the transdermal patch formulated with crude bio wastes and plant extracts against GSK-3 beta - an in silico study	Subbukutti V., Sailatha E., Gunasekaran S., **Manibalan S.**, Uma Devi K.J., Bhuvaneshwari K., Suvedha R.	BT	Journal of Biomolecular Structure and Dynamics	Article	2023	April	7391102	https://www.tandfonline.com/journals/tbsd20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85151648098&doi=10.1080%2f07391102.2023.2194424&partnerID=40&md5=299cf34d744ed5162e76cc876435bb23	Scopus
4	Spectroscopic Investigation, DFT Calculations, anti-Inflammatory Activity and Molecular Dynamic Simulation Study on Fagaramide Alkaloid	Priscilla J., Arul Dhas D., Hubert Joe I., **Ronaldo Anuf A.**	BT	Polycyclic Aromatic Compounds	Article	2023	June	10406638	https://www.tandfonline.com/journals/gpol20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85133829168&doi=10.1080%2f10406638.2022.2094973&partnerID=40&md5=2918e8931c6f8140ffbf163e6aac9044	Scopus
5	In silico approach for enhancing innate lipid content of Yarrowia lipolytica, by blocking the acyl-CoA oxidase-1 enzyme, using various analogous compounds of lipids	Sundaramahalingam M.A., Amrutha C., Rajeshbanu J., Thirukumaran K., **Manibalan S.**, Ashokkumar M., Sivashanmugam P.	BT	Journal of Biomolecular Structure and Dynamics	Article	2023	Febrary	7391102	https://www.tandfonline.com/journals/tbsd20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85119982996&doi=10.1080%2f07391102.2021.2008498&partnerID=40&md5=5e2f32bc70255693886958 4d5d82cc99	Scopus
6	Antimicrobial activity of green synthesized biodegradable alginate–silver (Alg-Ag) nanocomposite films against selected foodborne pathogens	**Kanagaraj S.S.P.**, Rajaram S.K., Ahamed M., Subedhar S., **Sankar K.**, **Innasimuthu G.M.**, Karuppiah P.	BT	Applied Nanoscience (Switzerland)	Article	2023	January	21905509	https://www.springer.com/journal/13204	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85107395818&doi=10.1007%2fs13204-021-01882-9&partnerID=40&md5=0c7119fd513e42b3a85f773e8e862f86	Scopus

	Title	Dept	Journal	Type	Year	Month	ID/ISBN	Journal Link	Scopus Link	Indexed
7	Review on rewiring of microalgal strategies for the heavy metal remediation - A metal specific logistics and tactics	BT	Chemosphere	Article	2023	February	456535	https://www.sciencedirect.com/journal/chemosphere	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85144884018&doi=10.1016%2fj.chemosphere.2022.137310&partnerID=40&md5=9206c0a9bf93eceda0658f48203a1cb6	Scopus
8	Use of activated Chromolaena odorata biomass for the removal of crystal violet from aqueous solution: kinetic, equilibrium, and thermodynamic study	BT	Environmental Science and Pollution Research	Article	2023	February	9441344	https://www.springer.com/journal/11356	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85138726078&doi=10.1007%2fs11356-022-22822-2&partnerID=40&md5=829b39f05781555cfec1f6bf12903b5b	Scopus
9	Studies on thermoset blend of bismaleimide having multiple swivel groups and biscyanate ester	Chemistry	Journal of Elastomers and Plastics	Article	2023	April	952443	https://journals.sagepub.com/home/JEP	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85148413748&doi=10.1177%2f00952443231158780&partnerID=40&md5=58d221f3b23e06e113f8c0d4012904db	Scopus
10	Corrosion resistance behaviour of concrete containing treated used foundry sand	CIvil	European Journal of Environmental and Civil Engineering	Article	2023	April	19648189	https://www.tandfonline.com/journals/tece20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85134177559&doi=10.1080%2f19648189.2022.2099982&partnerID=40&md5=4b794abcae5b4147c554252dfece7590	Scopus
11	Performance of green concrete paving block imbibed with industrial scrap steel mill scale for sustainable construction	Civil	Materials Research Express	Article	2023	March	20531591	https://iopscience.iop.org/journal/2053-1591	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85151533789&doi=10.1088%2f2053-1591%2facc56b&partnerID=40&md5=445affcf6659c5d47fec03f11176d6eb	Scopus
12	Reinforced Concrete Durability Design Through a Semi-probabilistic Approach	Civil	Periodica Polytechnica Civil Engineering	Article	2023	june	5536626	https://pp.bme.hu/ci/article/view/21350	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85163594169&doi=10.3311%2fPPci.21350&partnerID=40&md5=1f6ed6134ef8f128a2fcac3249414f55	Scopus
13	Structural Behaviour of Cold Formed Steel Sections Based on Fasteners	Civil	Techniques and Innovation in Engineering Research	Book Chapter	2022	December	978-81-959996-2-0	https://stm.bookpi.org/TAIER-V6/index	https://doi.org/10.9734/bpi/taier/v6/2996C	No
14	Automatic detection of microaneurysms using a novel segmentation algorithm based on deep learning techniques	aths	Computational Intelligence	Article	2023	June	8247935	https://onlinelibrary.wiley.com/journal/14678640	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85163050508&doi=10.1111%2fcoin.12588&partnerID=40&md5=8fc9e513e7ba3e897a49edb3cac2c6dd	Scopus

Authors:
- 7: Aravind M.K., Vignesh N.S., Gayathri S., Anjitha N., Athira K.M., Gunaseelan S., Arunkumar M., Sanjaykumar A., Karthikumar S., **Ganesh Moorthy I.M.**, Ashokkumar B., Pugazhendhi A., Varalakshmi P.
- 8: Soosai M.R., **Moorthy I.M.G.**, Varalakshmi P., Syed A., Elgorban A.M., Rigby S.P., Natesan S., Gunaseelan S., Joshya Y.C., Baskar R., **Kumar R.S., Karthikumar S.**
- 9: **Dhanalakshmi J.**, Siva Kaylasa Sundari S., Sivaprakash S., Vijayakumar C.T.
- 10: Gurumoorthy N., Rajesh Kumar K., Vinod Kumar M., **Hariharan Kannan K.**
- 11: **Parvathikumar, Ganeshprabhu.**, Balachandran G.B., **Sahadevan, Brintha**
- 12: **Paulpandian, Murali Kannan Sundhar.**, Neves R.
- 13: S. Karthikeyan K. M. Jeevananthan T. Karis Prabakar R. Harini **S. P. Murali Kannan**
- 14: Monisha Birlin T., Divya C., **John Livingston J.**

15	A novel image recognition using Fuzzy C-Means and content-based fabric image retrieval	Meenakshi A., Janani A.P., Devi Mahalakshmi S., Vanitha Sivagami S.	CSC	Imaging Science Journal	Article	2023	March	13682199	https://www.tandfonline.com/journals/yims20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152076651&doi=10.1080%2f13682199.2023.2183316&partnerID=40&md5=bf35b7d63c4101230c47b4a076ac79e1	Scopus
16	Cloud-based Detection of Malware and Software Privacy Threats in Internet of Things using Deep Learning Approach	Narmadha C., **Muthuselvi R.**, Somasundari P., Sivagurunathan G., Malini K.V., Sathishkannan	CSC	SSRG International Journal of Electronics and Communication Engineering	Article	2023	April	23488549	https://www.internationaljournalssrg.org/IJECE/index.html	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85161367592&doi=10.14445%2f23488549%2fIJECE-V10I4P103&partnerID=40&md5=3fc95863fad0d8e1c92e7da21273dc82	Scopus
17	A Review of Decisive Healthcare Data Support Systems	Nayaki A.P., Thanabal M.S., **Leelarani K.**	CSC	Lecture Notes on Data Engineering and Communications Technologies	Book Chapter	2023	July	23674512	https://link.springer.com/book/10.1007/978-981-19-1844-5	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85134731642&doi=10.1007%2f978-981-19-1844-5_58&partnerID=40&md5=f8edcd8b56aa117a6d2727f784da2e89	Scopus
18	Design and Analysis of Dual Band MIMO Antenna for WLAN and ISM Band Applications	Ilangovan G., Vasudevan K., **Maheswari G.U.**	CSC	WiSPNET 2023 - International Conference on Wireless Communications, Signal Processing and Networking	Conference Paper	2023	May	9.79835E+12	https://ieeexplore.ieee.org/document/10133994	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85162038667&doi=10.1109%2fWiSPNET57748.2023.10133994&partnerID=40&md5=9205d0c4e91fbd927658d2d2c5abc948	Scopus
19	Blockchain based Secure Erlang Server for Request based Group Communication over XMPP	Johnpaul C.I., Vivekanandan M., **Premkamal P.K.**, **Ramya R.**	CSC	2023 International Conference on Advances in Intelligent Computing and Applications, AICAPS 2023	Conference Paper	2023	March	9.79835E+12	https://ieeexplore.ieee.org/document/10074294	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152191003&doi=10.1109%2fAICAPS57044.2023.10074294&partnerID=40&md5=cc1dbe9f302611c8c161038b5b9676d0	Scopus
20	Blockchain based Secure Data Storage Verification Algorithm for Smart City Environment	Vivekanandan M., **Premkamal P.K.**, Johnpaul C.I., Ebinazer S.E.	CSC	2023 International Conference on Innovative Trends in Information Technology, ICITIIT 2023	Conference Paper	2023	March	9.78167E+12	https://ieeexplore.ieee.org/document/10068638	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152082372&doi=10.1109%2fICITIIT57246.2023.10068638&partnerID=40&md5=f6c58278a330b982eb8c607c0555bdb8	Scopus
21	AN INTELLIGENT SENSOR BASED AUTOMATIC ATTENDANCE MANAGEMENT SYSTEM USING IOT	Dr.A.Meenakshi, Mrs.K.Leelarani, Ms.S.Shopika, Mr.M.Rajasekaran	Csc	International Journal on Recent and Innovation Trends in Computing and Communication	Article	2022	December	2321-8169	https://ijritcc.org/index.php/ijritcc	https://doi.org/10.17762/ijritcc.v10i2s.5909	No
22	High Performance Computing Model for Real Time Online Credit Card Fraudulent Identification Using ESVDS and SPSO	KAVITHA. P, SELVAKUMAR.S, S.P. Raja	Csc	IOSR Journal of Computer Engineering	Article	2023	March	2278-0661	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.iosrjournals.org/iosr-jce/papers/Vol25-issue2/Ser-1/A2502010114.pdf	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.iosrjournals.org/iosr-jce/papers/Vol25-issue2/Ser-1/A2502010114.pdf	

23	Design of Vaccine storage and transportation in remote areas	P. Kavitha, T.R.Vishnu Kumar, J.Sridhar, N.Pravin Raja	Csc	International journal of Advances in Engineering and Management (IJAEM)	Article	2023	March	2395-5252	https://www.ijaem.net/current-issue.php?issueid=53&title=Design%20of%20Vaccine%20storage%20and%20transportation%20in%20remote%20areas	https://www.ijaem.net/current-issue.php?issueid=53&title=Design%20of%20Vaccine%20storage%20and%20transportation%20in%20remote%20areas	No
24	Threat Detection Using RF Algorithm	Mrs.Sangeetha.V, Balaji.S, Balakrishnan.S, Hariharan.G.S	Csc	International journal of Advances in Engineering and Management (IJAEM)	Article	2023	March	0976-1353	https://ijaem.net/issue_dcp/Threat%20Detection%20Using%20Rf%20Algorithm.pdf	https://ijaem.net/issue_dcp/Threat%20Detection%20Using%20Rf%20Algorithm.pdf	No
25	An IOT Enabled Wireless Greenhouse Monitoring System	X. Ignatius Selvarani, R. M. Sujith, I. Adithyan	Csc	International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)	Article	2023	August	2394-2320	https://ijercse.com/current-issue.php?volume=Volume10&issue=Issue3	https://ijercse.com/viewabstract.php?id=16207&volume=Volume10&issue=Issue3	No
26	Breast Cancer Prediction and Analysis Using Xception Model	G.Mahalakshmi, R.Muthuselvi, M.Uma Maheswari, T.P.Subradeepa, S.Kanaga Lakshmi	Csc	International Journal of Engineering and Artificial Intelligence	Article	2023	April	2708-2792	https://www.ijeai.com/archive/volume-4-issue-2	Not availlable	No
27	Sharing Personal Health Data by Blockchain with Cloud Storage Technologies	Balamuralikrishnan G, Balakrishnan G, V.Rajeshkannan, R.Ramya, A.Alagar	Csc	Eur. Chem. Bulletin	Article	2023	june	2063-5346	https://www.eurchembull.com/uploads/paper/86768e3452de187cd8b928bc3b46e2de.pdf	https://www.eurchembull.com/uploads/paper/86768e3452de187cd8b928bc3b46e2de.pdf	No
28	(C-R)NN Model for Detection of Schizophrenia	V.Vivek Rajan, S.Athilakshmi, A.Meenakshi, G.Mahalakshmi	Csc	Novyi Mir Research	Article	2023	june	0130-7673	https://novyimir.net/volume-8-issue-6-2023/	https://drive.google.com/file/d/145HMD2WgBZa_td7QwYyFC-M6C9DE3Di_/view	No
29	Weighted Moth-Flame Optimization Algorithm for Edible Oil Quality Detection Using Microwave Technologies	Ashok R., Sundaram M., Jaffino G., Jose J.P.	ECE	Food Analytical Methods	Article	2023	july	19369751	https://www.springer.com/journal/12161	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85165135900&doi=10.1007%2fs12161-023-02517-1&partnerID=40&md5=99c279b1568e98b53b48992c276b212b	Scopus
30	ALMEGA-VIR: face video retrieval system	**Prathiba T**., Shantha Selva Kumari R., Chengathir Selvi M.	ECE	Imaging Science Journal	Article	2023	June	13682199	https://www.tandfonline.com/journals/yims20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85162942482&doi=10.1080%2f13682199.2023.2225372&partnerID=40&md5=42d5069c8793c41237b2edbc85ca3b91	Scopus
31	An energy efficient deep learning model for intrusion detection in smart healthcare with optimal feature selection mechanism	Rajalakshmi R., Sivakumar P., **Prathiba T**., Chatrapathy K.	ECE	Journal of Intelligent and Fuzzy Systems	Article	2023	January	10641246	https://content.iospress.com/journals/journal-of-intelligent-and-fuzzy-systems/Pre-press/Pre-press	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85148070662&doi=10.3233%2fJIFS-223166&partnerID=40&md5=b43a4064206035246a1c37c64f38e922	Scopus
32	A Contemporary approach to review clustering algorithms in wireless sensor networks	Thilagavathi S., **Geethapriya C**.	ECE	Journal of Intelligent and Fuzzy Systems	Article	2023	January	10641246	https://content.iospress.com/journals/journal-of-intelligent-and-fuzzy-systems/Pre-press/Pre-press	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85148047980&doi=10.3233%2fJIFS-210858&partnerID=40&md5=b5bf284ca64017a2220bf565d3f468c7	Scopus

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33	Chicken Swarm Optimization Based Optimal Channel Allocation in Massive MIMO	**Nisha Rani S.**, Indumathi G.	ECE	Wireless Personal Communications	Article	2023	April	9296212	https://www.springer.com/journal/11277	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85150423091&doi=10.1007%2fs11277-023-10225-6&partnerID=40&md5=54829e3551d95e86d09339cba7823c56	Scopus
34	Optimum design of planar quasi-Yagi antenna for wearable Internet of Things (IoT) applications	Ruby Dass,Gopalakrishnan Thirumoorthy, Gayathri Ananthakrishnan, Suresh Babu Rajendran	ECE	Microwave Optical Technology Letters	Article	2023	July	1098-2760	https://onlinelibrary.wiley.com/journal/10982760	https://onlinelibrary.wiley.com/doi/abs/10.1002/mop.33839	Scopus
35	Solar Photovoltaic System Performance Improvement Using a New Fault Identification Technique	**Ganesan S., David P.W.**, Murugesan P., Balachandran P.K.	EEE	Electric Power Components and Systems	Article	2023	july	15325008	https://www.tandfonline.com/journals/uemp20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85165562567&doi=10.1080%2f15325008.2023.2237013&partnerID=40&md5=72c86d7cc203ad5675e099b48eda4a54	Scopus
36	Experimental study of bifacial photovoltaic module with waste polyvinyl chloride flex and acrylonitrile butadiene styrene road side safety sticker as an alternative reflector: optimization using response surface methodology	Thangaraj H., **David, Prince Winston., Balachandran, Gurukarthik Babu.**, Murugesan P.	EEE	Environmental Science and Pollution Research	Article	2023	June	9441344	https://www.springer.com/journal/11356	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85162689844&doi=10.1007%2fs11356-023-28257-7&partnerID=40&md5=ba528a90fb7d1c968d7fc5c30ace9076	Scopus
37	A novel approach to predict competency and the hidden risk factor by using various machine learning classifiers	M S., **S, Kalyan**i.	EEE	Automatika	Article	2023	April	51144	https://www.tandfonline.com/journals/taut20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85153038818&doi=10.1080%2f00051144.2023.2200347&partnerID=40&md5=e75942dd0f4bdcb19f7a134a493dfed5	Scopus
38	Non-Intrusive Residential Load Monitoring System Using Appliance: Based Energy Disaggregation Models	**Paramasivam Mohan Devie., Sundaram, Kalyani**	EEE	Journal of Electrical Engineering and Technology	Article	2023	April	19750102	https://www.springer.com/journal/42835	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85151409476&doi=10.1007%2fs42835-023-01475-2&partnerID=40&md5=7e7f7aad2a1f1c873acdf87a9250be55	Scopus
39	Performance analysis of n-type PERT bifacial solar PV module under diverse albedo conditions	**Ganesan K., Winston D.P.**, Sugumar S., **Jegan S.**	EEE	Solar Energy	Article	2023	March	0038092X	https://www.sciencedirect.com/journal/solar-energy	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85147213191&doi=10.1016%2fj.solener.2023.01.020&partnerID=40&md5=9eb9d033926541e222fc8cc3df795cc9	Scopus
40	Enhanced Method of Mitigating Voltage Sags and Swells Using Optimized Fuzzy Controlled DVR	Singh O.J., **David, Prince Winston.**	EEE	Iranian Journal of Science and Technology - Transactions of Electrical Engineering	Article	2023	March	22286179	https://www.springer.com/journal/40998	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85140132570&doi=10.1007%2fs40998-022-00556-8&partnerID=40&md5=8e612f97b620562fd921b40bf60edde7	Scopus

No.	Title	Authors	Dept	Journal	Type	Year	Month	Number	Link	Scopus/Drive Link	Indexing
41	Battery based mismatch reduction technique for partial shaded solar PV system	Murugesan P., **David, Prince Winsto**n., **Murugesan, Pravin**, Periyasamy P.	EEE	Energy	Article	2023	June	3605442	https://www.sciencedirect.com/journal/energy	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85150817640&doi=10.1016%2fj.energy.2023.127063&partnerID=40&md5=8ff56673036243884fcf6d26927672c9	Scopus
42	Fault identification scheme for solar photovoltaic array in bridge and honeycomb configuration	**Ganesan, Sakthive**l., **David, Prince Winsto**n., Balachandran P.K., Senjyu T.	EEE	Electrical Engineering	Article	2023	August	9487921	https://www.springer.com/journal/202	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152367654&doi=10.1007%2fs00202-023-01816-4&partnerID=40&md5=cce87e40edf15264e3b21c7c71519d93	Scopus
43	Fabrication of Natural Dye Extractor	Hari Prasath.T, Ganesan.R	EEE	Journal For Basic Sciences	Article	2023	March	1006-8341	https://fzgxjckxxb.com/volume-23-issue-3-2023/	https://drive.google.com/file/d/1BYtHIJWbeENWSPTZbysBzStm0wrzEC54/view	No
44	Experimental Investigations of Portable Ball Throwing Machine	Mr.Jegan.S, Mr.Ganesan.R	EEE	MOENIA JOURNAL	Article	2023	March	1137-2346	https://moenia.net/volume-10-issue-3-2023/	https://drive.google.com/file/d/1YgwnZHsOi_ByFGOSWcT640VMGNz1O5g9/view	No
45	Two Phase To Three Phase Converter For Agriculture Pumping	**Dr.Mariappan**.D, Mr.Natesh vel.R, Mr.Abiseak kumar.S, Mr.Hari Krishnan.S	EEE	Journal For Basic Sciences	Article	2023	March	1006-8341	https://fzgxjckxxb.com/volume-23-issue-3-2023/	https://drive.google.com/file/d/1PG_CWwootbHjabuGPkS3kCIfp1Ra0Rqz/view	No
46	**The cross cultural and sociopolitical realities of India in Manohar Malgonkar novels**	Mr.S.Pradeepkumar	English	Shodha prabha	Article	2022	Not availlable	0974-8946	Not availlable	Not availlable	UGC
47	Multimodal Paddy Leaf Diseases Detection Using Feature Extraction and Machine Learning Techniques	**Kaviya P.**, Selvakumar B.	IT	Lecture Notes in Networks and Systems	Conference Paper	2023	June	23673370	https://link.springer.com/book/10.1007/978-981-99-1203-2	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85164932943&doi=10.1007%2f978-981-99-1203-2_42&partnerID=40&md5=1124d13c96c9bc5231c0f7235b8012ab	Scopus
48	Water Quality Prediction for Agriculture	Dr. R. Arthy, G. Siva Prakash, A. Rakesh, A. Gowri Superamanian	IT	International Journal of Novel Reswearch and Development	Article	2023	Not availlable	2456-4184	not	not	No
49	Development and Characterization of Sustainable Bioplastic Films Using Cellulose Extracted from Prosopis juliflora	M K M., P M., Khan A., **M, Geetha**., K K., Abduljabbar A.H., Syafri E., Wazzan M.A., Wazzan H., Khan W.	Maths	Journal of Natural Fibers	Article	2023	July	15440478	https://www.tandfonline.com/journals/wjnf20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85164289271&doi=10.1080%2f15440478.2023.2231271&partnerID=40&md5=a8ef580c65d237dcb6d941bcebf7f12b	Scopus
50	Investigation of Fiber-Based Bag Filter Coated with Metal Oxides for Dust Adsorption	Mariappan Kadarkarainadar M., **Mariappan, Geetha**	Maths	Fibers	Article	2023	January	20796439	https://www.mdpi.com/2079-6439/11/1/10	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85146741748&doi=10.3390%2ffib11010010&partnerID=40&md5=b156d24c4e275165ab8e63791afd43cc	Scopus
51	A characterization of group vertex magic trees of diameter up to 5	Sabeel K M., Paramasivam K., Prajeesh A.V., **Kamatchi N.**, Arumugam S.	Maths	Australasian Journal of Combinatorics	Article	2023	February	10344942	https://ajc.maths.uq.edu.au/pdf/85/ajc_v85_p049.pdf	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85142847599&partnerID=40&md5=6181eab8ec7615b64e597ff15b5a8ffa	Scopus

	Title	Authors	Dept	Journal	Type	Year	Month	ISSN	Link	Indexing
52	Experimental studies on automated DC pulsed MIG welding of Monel 400 sheets	**Narayanasamy P., Parrthipan B.K.**, Ramkumar T., Sivashanmugam N.	Mech	Materials and Manufacturing Processes	Article	2023	July	10426914	https://www.tandfonline.com/journals/lmmp20	Scopus
53	Utilization of bio-waste material pomegranate peel powder along with silver nitrate and polyvinyl alcohol to form a hybrid biofilm	Rathinavel S., **Saravankumar S.S.**, Senthilkumar T.S., Barile C., Kumar S.S., **Prithviraj M.**	Mech	Biomass Conversion and Biorefinery	Article	2023	June	21906815	https://www.springer.com/journal/13399	Scopus
54	Evaluation of physiochemical, mechanical, thermal, UV barrier, and biodegradation properties of PVA/corn (Zea mays) cob powder biofilms	**Balavairavan B., Saravanakumar S.S., Senthamaraikannan P.**, Indran S., Siengchin S.	Mech	Biomass Conversion and Biorefinery	Article	2023	June	21906815	https://www.springer.com/journal/13399	Scopus
55	Characterization of tamarind fruit shell power-reinforced virgin and recycled polypropylene-based 3D-printed composites	**Madhan N.R., Senthil S.**	Mech	Biomass Conversion and Biorefinery	Article	2023	May	21906815	https://www.springer.com/journal/13399	Scopus
56	Delamination study on glass/carbon hybrid composite laminates for structural applications	Murugan R., Sandeep S., Ragulraj R., **Saravanakumar S.S.**, Gnanakumar G.	Mech	Materials Today: Proceedings	Article	2023	January	22147853	https://www.sciencedirect.com/journal/materials-today-proceedings	Scopus
57	Effect of strain rate on fractography texture descriptor of AA6063/(Si3N4)x/(Cu(NO3)2)y (x=12%, y = 2–6%)composite after multiple ECAP passes: second order statistical texture analysis conjunction with regression analysis	Sureshkumar P., Ganesan L., UmaRani C., Stalin B., Sasikumar C., **Rajan S.T.K.**, Borek W.	Mech	Journal of Materials Research and Technology	Article	2023	March	22387854	https://www.sciencedirect.com/journal/journal-of-materials-research-and-technology	Scopus
58	Evaluation of characteristic features of untreated and alkali-treated cellulosic plant fibers from Mucuna atropurpurea for polymer composite reinforcement	**Senthamaraikannan P., Saravanakumar S.S.**	Mech	Biomass Conversion and Biorefinery	Article	2023	August	21906815	https://www.springer.com/journal/13399	Scopus
59	Effect of Cocos nucifera shell powder on mechanical and thermal properties of Mucuna atropurpurea stem fibre-reinforced polyester composites	**Senthamaraikannan P., Saravanakumar S.S.**	Mech	Biomass Conversion and Biorefinery	Article	2023	August	21906815	https://www.springer.com/journal/13399	Scopus
60	Cellulosic fiber extraction and characterization from derris scandens (Roxb.) benth root for polymer composite reinforcements	**Prithiviraj M.**, Subbiah R., Manimaran P., **Kannan K.**	Mech;MTR	Biomass Conversion and Biorefinery	Article	2023	August	21906815	https://www.springer.com/journal/13399	Scopus

	Title	Authors	Department	Journal	Type	Year	Month	ISSN/ID	Link 1	Link 2	Indexing
61	Cenosphere filled epoxy composites: structural, mechanical, and dynamic mechanical studies	Pratheesh K., **Narayanasamy P.**, Prithivirajan R., Ramkumar T., **Balasundar P.**, Indran S., Sanjay M.R., Siengchin S.	Mech;MTR	Biomass Conversion and Biorefinery	Article	2023	April	21906815	https://www.springer.com/journal/13399	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85151555491&doi=10.1007%2fs13399-023-04154-4&partnerID=40&md5=023f41e62aa3e12c0e74ef277a92df43	Scopus
62	Microstructure and tribological properties of microwave-sintered Ti0.8Ni–0.3Mo/TiB composites	**Balasundar P., Senthil S., Narayanasamy P.**, Ramkumar T.	MTR;Mech	Ceramics International	Article	2023	February	2728842	https://www.sciencedirect.com/journal/ceramics-international	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85142391326&doi=10.1016%2fj.ceramint.2022.11.085&partnerID=40&md5=18777b7861aaeb0871c1fba49c701fb4	Scopus
63	Mechanical, thermal, electrical, and corrosion properties of microwave-sintered Ti-0.8Ni-0.3Mo/TiB composites	**Balasundar P., Senthil S., Narayanasamy P.**, Ramkumar T.	MTR;Mech	Physica Scripta	Article	2023	June	318949	https://iopscience.iop.org/journal/1402-4896	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85160559726&doi=10.1088%2f1402-4896%2facd6c5&partnerID=40&md5=8ba8cde5e368d7c617dc85c5c6809550	Scopus
64	Effect of ionic liquids on the performance of dye-sensitized solar cells using poly(vinyl alcohol)/ polypyrrole based polymer electrolytes	**K. M, Manikandan**	Physics	Energy Sources, Part A: Recovery, Utilization and Environmental Effects	Article	2023	March	15567036	https://www.tandfonline.com/journals/ueso20	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85150513813&doi=10.1080%2f15567036.2023.2184433&partnerID=40&md5=b92d6abb735abd1764735259f68f7d76	Scopus
65	Structural, morphological, and electrochemical studies of Mg2SiO4-Pr6O11 nanocomposite for energy storage applications	Karthikeyan B., **Sakthiraj K.**, Sakthivel A.	Physics	Physica Scripta	Article	2023	January	318949	https://iopscience.iop.org/journal/1402-4896	https://www.scopus.com/inward/record.uri?eid=2-s2.0-85147330798&doi=10.1088%2f1402-4896%2facb4c2&partnerID=40&md5=0c1c8e3f04201e727bfcdbf7dec880e2	Scopus
66	ergy with a One-minute activity to improve Engli	Dr.B.Kayalvizhi., Mr.S.Pradeep Kumar	English	Rabindra Bharati Journal of Philosophy	Article	2023		0973-0087			UGC
67	Enhancement of Proton Density Weighted Magnetic Resonance Images using Singular Value Decomposition in Wavelet Domain	K Kannan	MTRE	Research & Reviews: Journal of Embedded System & Applications	Article	2022		**2395-6712**	https://computerjournals.stmjournals.in/index.php/JoESA/index	https://computerjournals.stmjournals.in/index.php/JoESA/article/view/930	NO
68	Bipolar Fuzzy PROMETHEE-based Decision-Making Trust Model for guaranteeing data dissemination reliability in Internet of Things	Vendhan Duraisamy Miruna Joe Amali Suthanthira Amalraj Alageswaran Ramaiah	Information Technology	International Journal of Communication Systems	Article	2022	August	1099-1131	https://onlinelibrary.wiley.com/journal/10991131	https://kcetvnrorg-my.sharepoint.com/:b:/g/personal/senthamaraimech_kamarajengg_edu_in/EdaIwp78If5MrJm-sypjW5YBHXMo1CkDRy23KjNIdYuyPQ?e=AbySWh	Scopus
69	Application of Partial Differential Equations in Multi Focused Image Fusion,	K.Kannan	MTRE	Int. J. Advanced Networking and Applications	Article	2022		0975-0290	https://www.i-scholar.in/index.php/IJANA/index	https://www.ijana.in/papers/V14I1-5.pdf	NO

ORIGINAL PAPER

Synthesis, characterization and non-isothermal degradation kinetics of rose Bengal end capped poly(aniline)/Cr$_2$O$_3$ nanocomposite

M. Kenet Nancy Mary[1] · A. Jancirani[2] · R. Baskaran[3] · R. Anbarasan[4]

Abstract

Solution polymerization of Ani was carried out in the presence of peroxydisulfate as a free radical initiator under N$_2$ atmosphere at 0–5 °C for 2 h both in the presence and absence of Cr$_2$O$_{3(bulk)}$ material under vigorous stirring condition. During the polymerization reaction, the Rose Bengal dye was added as an end capping agent. The above synthesized polymers were characterized by FTIR, UV–visible, fluorescence emission, XPS, XRD, DSC, TGA, SEM, HR-TEM, viscosity and conductivity measurements. The added Cr$_2$O$_{3(bulk)}$ controlled the structure of poly(aniline) (PANI) and the same can be confirmed by FTIR spectroscopy. The T_g of Cr$_2$O$_3$ mediated PANI showed somewhat higher value than the pristine PANI. The XPS showed the presence of Cr3d2p$_{3/2}$ and Cr3d2p$_{1/2}$ peaks and this confirmed the nano-sized crystalline Cr$_2$O$_3$. Further, its thermal degradation was studied by non-isothermal degradation kinetics and their thermodynamic parameters were determined. The experimental data were compared with the available literature data.

Graphical abstract
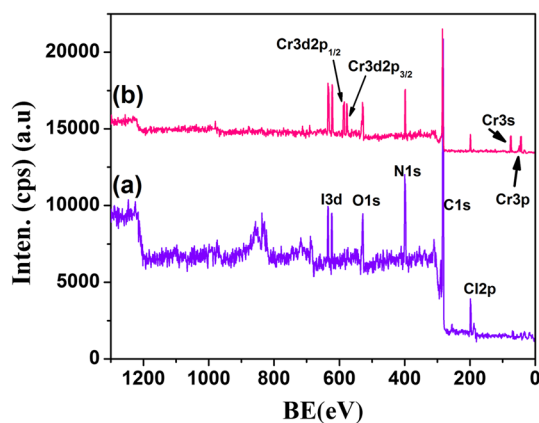
Keywords Synthesis of PANI/Cr$_2$O$_3$ · Characterization of nanocomposites · HR-TEM · XPS · Non-isothermal degradation kinetics · Thermodynamic parameters

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ORIGINAL PAPER

Microwave Assisted Extraction of Polyphenols from *Pithecellobium dulce Benth* Fruit Peels and Evaluation of its Anticancer and Antioxidant Activity

Selvakumar Murugesan[1,2] · Prakash Maran[3] · Manigandan Venkatesan[4] · Ronaldo Anuf Alexander[5]

Abstract

Polyphenols are great interest in recent decades due to the potential health benefits such as protection against development of carcinoma, diabetes, obesity, osteoporosis neurodegenerative and cardiovascular diseases etc. Therefore, researchers and scientists have been more interested in the extraction of polyphenols from plant resources. The present study investigates the microwave-assisted extraction of polyphenols from the *Pithecellobium dulce* fruit peels. ANOVA pareto analysis and Response surface methodology was employed to analyse the effect of process variables on delignification. Four independent process variables such as microwave irradiation power, microwave irradiation time, pH and Liquid to solid ratio (LSR) were analysed. Microwave-assisted aqueous extraction facilitated in maximum yield of polyphenols from the fruit peels (79.18 mg GAE/g dw). The polyphenol extract exhibited potential antioxidant (IC_{50} of 63.18 µg/ml) and anticancer (LD_{50} of 61.3 µg/ml) activity using radical scavenging DPPH and MTT assay respectively. Therefore, our study indicates that the polyphenolics rich, biologically potent *Pithecellobium dulce* fruit peel extracts can be a good therapeutic and nutraceutical supplement to treat cancer and related complications.
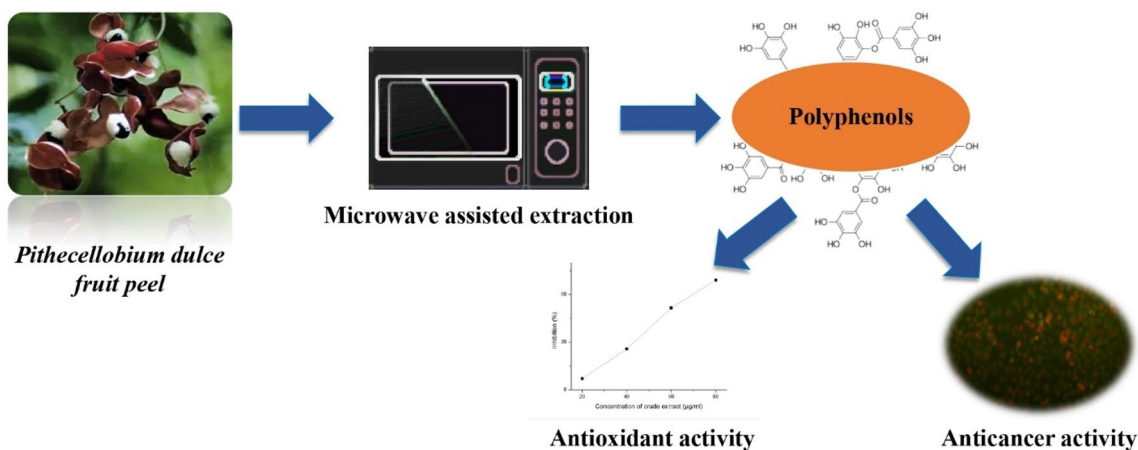
Graphical Abstract

Statement of Novelty

Pithecellobium dulce fruit peels have potential biological properties due to it high polyphenolic content. Hence recycling of *P. dulce* fruit peels are attracting topic in food

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Extended author information available on the last page of the article

Research Article

Evaluation of wound healing active principles in the transdermal patch formulated with crude bio wastes and plant extracts against GSK-3 beta - an *in silico* study

Veerabahu Subbukutti ✉ ⓘ, Ethirajulu Sailatha ⓘ, Sethu Gunasekaran ⓘ, Subramaniyan Manibalan ⓘ, Kumba Janarthanan Uma Devi ⓘ, Koteeswaran Bhuvaneshwari ⓘ & ...show all
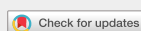
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Abstract

The wound-healing process is accelerated by inhibiting proteins that decelerate the wound-healing pathway. One of the active proteins involved in enhancing healing at the nuclear level and in gene expression is catenin. Inhibition of Glycogen Synthase Kinase 3β (GSK3 β) phosphorylates and degrades catenin via the downstream Wnt signalling pathway, thereby stabilizing catenin. A medicated wound dressing transdermal patch designed with fusion of bio wastes, viz. physiologically clotted fibrin, fish scale collagen, and the ethanolic extract of *Mangifera indica* (L.) and spider web, was analysed against GSK3β to enhance healing. In our earlier studies, the compounds present in the transdermal patch were identified using GC-MS analysis; 12 compounds exhibiting the wound healing mechanism were analyzed using PASS software and filtered out. From these 12 compounds, 6 compounds that possessed drug-likeness were screened by SwissADME and vNN-ADMET to dock against GSK3β in the present work. The PyRx results confirmed the binding of the six ligands to the active site of the target protein. Though the remaining filtered ligands also exhibited inhibitory activity, Molecular dynamics simulation studies were carried out with 100 ns on a complex of 10,12 Tricosadiyonic acid, Nopyl acetate and 2 Methyl 4 Heptanol as they showed binding affinity of −6.2Kcal/mol, −5.7Kcal/mol and −5.1Kcal/mol respectively. The stability of the complex was validated using MD simulation parameters RMSD, RMSF, Rg, and Number of Hydrogen bonds. These results implied that the transdermal patch would be efficient in accelerating the wound healing process through the inactivation of GSK3β.

Communicated by Ramaswamy H. Sarma

🔍 **Keywords:** Wound healing | glycogen synthase kinase | molecular docking | molecular dynamics

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Synergistic effect of fast extrusion furnace (FEF) black on viscosity and rheological properties of ethylene propylene diene monomer vulcanizate

A. R. Sivakumar[a], R. Baskaran[b], B. Gurukarthik Babu[c] (iD), and A. Murugesan[d]

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ABSTRACT

An investigation is made on vulcanizates based Ethylene propylene diene monomer (EPDM) rubber which is prepared by incorporating 30 phr of cellulose short fibres along with different loading levels of fast extrusion furnace black (FEF) at an increment level of 20 phr in two roll mill. EPDM rubber was found as an attractive candidate for the thermal insulation of case-bonded SRM due to the advantages such as low specific gravity, improved ageing properties, and longer shelf life. This research provides theoretical and experimental characterisation for the friction behaviours of EPDM rubber. The effect of FEF on viscosity and rheological properties of various EPDM compounds such as C1–C8 were fairly investigated using the Monsanto moving die Rheometer (MDR 2000), and Mooney viscometer. The curing characteristics like TS2, TS5, ML, MH, cure time (TC90), and viscosity of various EPDM compounds were extensively determined and the results were critically compared. It was fairly observed that the reinforcement of FEF along with cellulose short fibres in the EPDM compounds has made a greater impact on improving the rheological properties and showed the synergistic effect between the fillers and the rubber matrix. The increase in temperature causes a decrease in the friction coefficient.

1. Introduction

Elastomer plays an important role in modern times of industrialisation. The renewable materials and recycling materials are used for fresh applications. EPDM rubber is reported in early literatures for its excellence, for example it is used in the automotive seal system[1] and the white side walls of tires.[2] When compared with Polytetrafluoroethylene (PTFE) and/or metal, EPDM rubber (Ethylene propylene diene monomer (Keltan-512) rubber) is an example of a synthetic elastomer.[3,4] EPDM rubber is used in the production of tyres for truck & car off the road tyres (OTR), tire treads, V-belts and tubes in the automotive industry.[5–10] Due to its properties like high resistance to ozone, weather influences etc. Introduction of Fillers in the form of either powder or fibre increases its viscosity and rheological properties.

In recent years, the manufacture of elastomeric compounds has increased distinctly due to their well- balanced viscosity, rheological and surface morphological properties, processing capability and comparatively low cost.[11] The majority usage of elastomers would not be viable without reinforcing it with certain black fillers, like carbon blacks (CBs) and structured cellulose short fibres. The reinforcement can be defined as the improvement in viscosity,

rheological properties like ML, MH, TS5, T_{c90}, stiffness due to orientation of short fibres and dispersion of vulcanised compounds through the incorporation of finely divided porous particles'.[12,13] Today the most smart investigation techniques are used to characterise the reinforcing black and white mineral fillers and also to understand the incredible origin of interactions between the rubber- fillers.[14–16]

Rheology is deals with the study of deformation of materials and relating the important concepts such as shear stress, deformation rate, and viscosity. When rubber compounds are filled with different variety of additives it exhibits different rheological properties.[17] Reinforcement of rubber filled by carbon blacks was reported.[18] It is associated with the chemical and physical interactions between the polymer matrix and carbon blacks.[19–23] This is due to the presence of active polar groups such as phenol, carboxyl, and quinone on the carbon black surfaces.[24–26] These polar groups on the carbon black surfaces bonds with rubber because of its polar- polar interaction.[27] The degree of reinforcement depends on the concentration of carbon black and its properties like particle size, surface area, aggregate structure, distribution and its interaction.[28] The interaction can be improved by the introduction of polar groups by means of loading of several fastidious additives.[29] Particulate fillers increase the strength of an EPDM

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Research Articles

In silico approach for enhancing innate lipid content of *Yarrowia lipolytica,* by blocking the acyl-CoA oxidase-1 enzyme, using various analogous compounds of lipids

M.A. Sundaramahalingam, C. Amrutha, J. Rajeshbanu, K. Thirukumaran, S. Manibalan, Muthupandian Ashokkumar &
...show all

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Abstract

Yarrowia lipolytica is used as a model in this study to screen the potential candidates for inflating the innate lipid content of the cell. This study focuses on reducing the lipid degradation that occurs by the β-oxidation process and discursively increasing the innate lipid content. Acyl-CoA oxidase-1, the primary and initial enzyme involved in the lipid degradation pathway, was selected as a target and blocked using various lipid analogous compounds. The blocking study was carried out using molecular docking and dynamic studies using computation tools. The largest active site pocket located around the Phe-394 amino acid of the target protein is taken as a site for docking. The molecular docking was performed for the selected compounds (citric acid, Finsolv, lactic acid, oxalic acid, Tween-80 and Triton X-100) and the docking results were compared with the outcome of the standard molecule (octadecatrienoic acid). Citric acid, Finsolv, Tween-80 and Triton X-100 were found to be the potential candidates for blocking the target molecule in the static condition using docking studies, revealing a minimum binding energy requirement than the standard molecule. They were further taken for a dynamics study using GROMACS software. The RMSD, RMSF, number of hydrogen bond interactions and radius of gyration of the complex molecules were studied in a dynamic approach for 100 ns. Citric acid has been found to be the potential hit compound to block acyl-CoA oxidase-1 enzyme with its maximum hydrogen interaction and minimum fluctuations. It also revealed out the minimum total energy requirement for the complex formation.
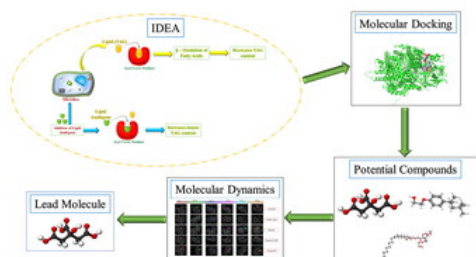
- **HIGHLIGHTS**

- Suggesting a discursive strategy for inflating innate lipid content in *Yarrowia lipolytica*

- Molecular docking dynamics study of acyl-CoA oxidase-1 of *Y. lipolytica* with lipid analogous compounds.
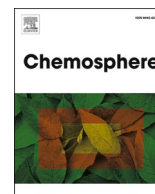
Review on rewiring of microalgal strategies for the heavy metal remediation - A metal specific logistics and tactics

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Nair Anjitha [a], Kottilinkal Manniath Athira [a], Sathaiah Gunaseelan [b], Malaisamy Arunkumar [b,c],
Ashokkumar Sanjaykumar [d], Sankar Karthikumar [e], Innasi Muthu Ganesh Moorthy [f],
Balasubramaniem Ashokkumar [a], Arivalagan Pugazhendhi [g], Perumal Varalakshmi [b,*]

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GRAPHICAL ABSTRACT
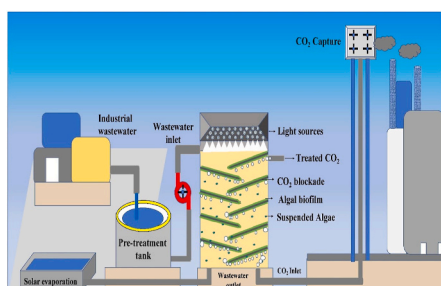
ARTICLE INFO

ABSTRACT

Phycoremediation of heavy metals are gaining much attention and becoming an emerging practice for the metal removal in diverse environmental matrices. Still, the physicochemical state of metal polluted sites is often found to be complex and haphazard in nature due to the irregular discharge of wastes, that leads to the lack of conjecture on the application of microalgae for the metal bioremediation. Besides, the foresaid issues might be eventually ended up with futile effect to the polluted site. Therefore, this review is mainly focusing on inter-pretative assessment on pre-existing microalgal strategies and their merits and demerits for selected metal removal by microalgae through various process such as natural attenuation, nutritional amendment, chemical pretreatment, metal specific modification, immobilization and amalgamation, customization of genetic elements and integrative remediation approaches. Thus, this review provides the ideal knowledge for choosing an efficient metal remediation tactics based on the state of polluted environment. Also, this in-depth description would provide the speculative knowledge of counteractive action required for pass-over the barriers and obstacles

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ORIGINAL ARTICLE

Antimicrobial activity of green synthesized biodegradable alginate–silver (Alg-Ag) nanocomposite films against selected foodborne pathogens

Sri Shaila Purna Kanagaraj[1] · Shyam Kumar Rajaram[1] · Maqusood Ahamed[2] · Shajahan Subedhar[3] · Karthikumar Sankar[1] · Ganesh Moorthy Innasimuthu[1] · Ponmurugan Karuppiah[4]

Abstract

In the recent past, the nanobiotechnology field has grown up tremendously with more applications because the synthesis process will be more practically possible techniques. Since, plant-derived biosynthesis of silver nanoparticles is superior since its eco-friendly, cost-efficient, speedy process in nature. Alginate-based eco-friendly, biodegradable nanocomposite films were prepared with *Celosia cristata* leaf extracts silver nanoparticles (CC-AgNPs) and sodium alginate by simple casting techniques. The synthesized alginate–silver (Alg-Ag) nanocomposite films were characterized and confirmed by UV/Vis spectroscopy, Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), thermogravimetric analysis (TGA) and atomic force microscopy (AFM). The various characterization process was further confirmed synthesized CC-AgNPs and Alg-Ag nanocomposite films. In addition, TEM and SEM monogram also showed uniformity and smooth surface of Alg-Ag nanocomposite films. The nanocomposite films displayed effective antimicrobial proficiency against selected foodborne pathogens i.e., *Staphylococcus aureus*, *Salmonella typhimurium* and *Clostridium perfringens*. Further, the Alg-Ag nanocomposite films resolve and eliminate the microbial intruders and enhance food stuff's quality and storage stability.

Keywords Green synthesis · Alg-Ag nanocomposite · Antimicrobial activity · Foodborne pathogens · Nanoparticles

Introduction

For the past few years, biopolymer-based nanocomposites have more attention in the food packaging field for their physical, mechanical, biodegradable properties. The nanocomposite films act as a dynamic food packing material because of their antimicrobial properties. These nanocomposite films resolve and eliminate the microbial intruders and enhance the quality and storage stability of foodstuffs (Gutt and Amariei 2020). In recent times, consumer needs for fresh foods have encouraged the scientist to establish the new techniques for improving the food quality through packaging systems.

Maintaining the quality of food is a major concern in food processing industries (Devlieghere et al. 2004). This antimicrobial system is possessed by the incorporation of nanoparticles. Among many metallic nanoparticles, silver has the most favorable antimicrobial function than other nanoparticles. Amongst several approaches for silver nanoparticles synthesis, the environment-friendly biosynthesis method was found to be "cost-effective, environment friendly and it can be simply scaled up for large scale synthesis" (Roy et al. 2019; Erdogan et al. 2019). Moreover, natural living materials such as plants (Masum et al. 2019; Pannerselvam et al. 2020; Govindappa et al. 2021), bacteria

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Research Article | Published: 23 September 2022

Use of activated *Chromolaena odorata* biomass for the removal of crystal violet from aqueous solution: kinetic, equilibrium, and thermodynamic study

Michael Rahul Soosai, Innasi Muthu Ganesh Moorthy ✉, Perumal Varalakshmi, Asad Syed, Abdallah Mohamed Elgorban, Sean Patrick Rigby, Sivrajasekar Natesan, Sathaiah Gunaseelan, Yonas Camy Joshya, Rajoo Baskar, Rajaram Shyam Kumar & Sankar Karthikumar

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Abstract

In the present study, biomass from the *Chromolaena odorata* plant's stem was activated using sulfuric acid to adsorb crystal violet (CV) dye. The adsorption operation of CV dye was studied considering the effect of variables like pH, initial dye concentration, time, adsorbent dosage, and temperature. The pseudo-second-order equation best fitted the kinetic study. The thermodynamic parameters such as activation energy (9.56 kJ/mol), change in Gibbs energy (81.43 to 96.7 kJ/mol), enthalpy change (6.89 kJ/mol), and entropy change (-254.4 J/mol K) were calculated. Response surface methodology estimated that at pH (4.902), adsorbent dosage (8.33 g/L), dye concentration (82.30 ppm), and temperature (300.13 K) dye removal of 97.53% is possible. FTIR, SEM, XRD, BJH, and BET confirmed adsorption operation. The adsorbent can be reused for 3 cycles effectively. Langmuir isotherm which best fitted the adsorption operation was used for designing a theoretical single-stage batch adsorber for large-scale operation.

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Research Article

Studies on thermoset blend of bismaleimide having multiple swivel groups and biscyanate ester

Dhanalakshmi J[1] , **Siva Kaylasa Sundari S**[1] , **Sivaprakash S**[2] **and CT Vijayakumar**[2]

Abstract
The materials 2,2-bis [4-(4-maleimidophenoxy phenyl)] propane (BMIX) and bisphenol-A based cyanate ester (BCY) were synthesized. The monomers BMIX and BCY were physically blended (BMCY) in 1:1 mol ratio. The materials BMIX, BCY and BMCY were thermally polymerized and the structural characterisation of the materials was done using Fourier transform infrared spectrophotometer (FTIR). The curing characteristics of BMIX, BCY and its blend (BMCY) were investigated using differential scanning calorimeter (DSC). The blend BMCY shows considerable differences in the thermal curing behaviour as evidenced by the DSC studies. Blending BCY with BMIX drastically reduces the melting temperature, curing onset temperature and the amount of heat liberated during thermal curing. The thermal stabilities of the crosslinked network polymers (PBMIX, PBCY and PBMCY) were investigated using thermogravimetric analyser (TGA). Detailed TGA studies indicated that the PBMCY shows better thermal stability than the PBMIX and PBCY. The DSC and TG curves indirectly hint about the possible reaction between BMIX and BCY during thermal curing. Woven glass fibre reinforced laminates were prepared using BMIX, BCY and BMCY by solution impregnation followed by drying and compression moulding. The glass laminate having BMCY as the matrix resin showed much better mechanical property (tensile strength) compared to the laminate made using BMIX as the matrix resin.

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Corrosion resistance behaviour of concrete containing treated used foundry sand

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ABSTRACT

In the last two decades, the scientific community, by the efforts of researchers, has witnessed many attempts to find alternative materials for natural sand using industrial waste materials instead of natural river sand, with a major goal of preserving the natural environmental resources. One of the industrial waste materials, is Used Foundry Sand (UFS), which is processed and used in concrete as a partial replacement for fine aggregate as Treated Used Foundry Sand (TUFS). The precise and all-inclusive investigation on the corrosion resistant characteristics of TUFS blended concrete is very scant. Therefore, experimentations were conducted to study the corrosion resistance performance of TUFS as partial replacements for fine aggregate. TUFS were substituted for fine aggregate in different weight percentages. The reinforced concrete specimens were casted to 5% NaCl under accelerated corrosion process. Apart from half-cell potential measurement, impress current techniques were employed to assess rebar corrosion, and microstructural analysis was carried out using X Ray Diffraction (XRD). According to test results, TUFS concrete has better corrosion resistance qualities than control concrete, paving the way for high-quality concrete production.

1. Introduction

The cost of construction materials has risen dramatically in recent years. Furthermore, there is a necessity for construction supplies to be always available as our natural resources (such as rocks for coarse aggregate and river sand for fine aggregate) are being depleted due to construction processes. In 2014, fine and coarse aggregate production consumed approximately 40 billion tones (Xiao et al., 2017). Fine aggregates make 20–35% of the volume of concrete mix. Fine aggregates used in manufacturing of concrete are generally natural river sand which is becoming more costly and considerably limited. On the other hand, hazardous waste materials are thrown into our natural environment without proper treatment, which affects the prosperous of nature. Hence there is an essential need to find an alternative way for protecting natural environment from the disposal of hazardous waste and from over exploitation of natural resources. To meet these needs, we can utilize waste products as alternate materials for fine aggregate. One of these materials is, high quality silica sand by product from the manufacturing of both ferrous and nonferrous metal casting industries, Used Foundry Sand (UFS) (Gurumoorthy & Arunachalam,

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Performance of green concrete paving block imbibed with industrial scrap steel mill scale for sustainable construction

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Abstract

The utilization of industrial waste materials in concrete compensates the shortage of natural resources by not only solving the problem due to disposal of wastes but also by developing alternative solutions to protect the environment as well as reduction in the area requirement for landfill. The concrete made with such wastages using less energy during its production and eco-friendly is called as Green Concrete. Variety of industrial wastes is employed as whole or partial substitution for coarse or fine aggregate. Steel mill scale is one such kind of waste materials produced as a result of hot process of rolling of steel in steel companies with rich source of iron content with least impurities. This research study investigates the viability of adopting steel mill scale as a partial substitute material for fine aggregate (M-sand). The current study investigates the influence on fresh and hardened concrete paving blocks and its properties, when M-sand is replaced at 0%, 20%, 40%, 60%, 80%, and 100% with steel mill scale using a mix ratio of 1:1.6:2.1 at sustained water-cement ratio value of 0.5 and target strength at 28 days of 30 Mega Pascal. Physical and chemical characterisation of the materials, concrete compressive strength, concrete split tensile strength, water absorption, and also micro-structural examination of hardened paving blocks are experimentally investigated. Results suggest that 60% of the replacements outperformed the originals. The research findings point towards the feasibility of producing paving blocks from scrap steel mill scale for enhancing environmentally friendly construction practices and sustainable pavement infrastructure.

Abbreviations

M-Sand	- Manufactured sand
SEM	- scanning electron microscope
IS	- Indian Standard
EDS	- Element Energy Dispersive Spectroscopy
EDAX	- Energy Dispersive x-ray Analysis
O	- Oxygen
Si	- Silicon
Al	- Aluminium
Fe	- Iron
Na	- Sodium
Mg	- Magnesium
Ca	- Calcium

Reinforced Concrete Durability Design Through a Semi-probabilistic Approach

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Abstract

This study provides a semi-probabilistic approach to durability design of reinforced concrete structures, subjected to carbonation-induced corrosion. The method was developed from an existing approach and using comprehensive data collated from the literature. A statistical model for predicting accelerated carbonation coefficient, using as input variables mix proportions and test conditions was also generated. The performance of the proposed method was assessed and proved appropriate. Besides delivering a more consistent semi-probabilistic method to design for the avoidance of unforeseen carbonation-induced corrosion problems, the developed statistical model to estimate the accelerated carbonation coefficient is a useful tool on the mix design, from the standpoint of conforming with the accelerated carbonation coefficients obtained through the semi-probabilistic method.

Keywords

acceleration, carbonation, multiple linear regression, performance-based design, service life, statistical modeling

1 Introduction

Atmospheric carbon dioxide reacts with alkaline compounds present in the cement paste, forming carbonates, which leads to a decrease in the alkaline nature of concrete [1]. The reduction in alkalinity leads to depassivation of the reinforcement so that it is no longer protected from corrosion [2]. Significant research has been carried out, comprising experimental investigation on carbonation mechanism [3], theoretical models proposed to predict carbonation depth of concrete based on experimental results [4], its practical application and life prediction models [5]. Seigneur et al. [6] used fully coupled two-phase reactive transport modeling focusing on the hydrated C3S paste and low-pH paste of the concrete. Taffese et al. [7] employed machine learning technique while Ta et al. [8] employed semi-empirical technique to predict carbonation of concrete. Auroy et al. [9], inferred that accelerated carbonation at 3% CO_2 could be the representative of natural carbonation.

In fact, over the last decade, several researchers have examined the natural carbonation data to estimate the durability of carbonated concrete structures [10, 11].

Research was carried out on parameters influencing carbonation: relative humidity, temperature, and atmospheric carbon dioxide concentration retrieved through respective Representative Concentration Pathways (RCPs) from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) [12, 13]. However, Jiang et al. [14] did not agree with the invariant relative humidity hypothesis and did not include relative humidity as a parameter in carbonation depth prediction under a changing climate. Due to its potential to lower carbon emissions and provide durable concrete, accelerated CO_2 curing for building materials has recently attracted more and more interest [15]. Research on CO_2 uptake after four-year natural exposure data and ten-year natural exposure data were reported to assess the CO_2 exchanges during the life cycle of structures [16, 17]. Performance-based design concepts for the durability of reinforced concrete structures against concrete carbonation have been recently developed [18, 19].

In order to obtain better control of corrosion of reinforcing steel, improved procedures for quality control and

Structural Behaviour of Cold Formed Steel Sections Based on Fasteners

S. Karthikeyan [a#*], K. M. Jeevananthan [at], T. Karis Prabakar [at], R. Harini [at] and S. P. Murali Kannan [b‡]

ABSTRACT

In developed countries, cold formed steel sections are widely utilized for a variety of purposes, including roofs in the form of deck sheeting and structural components like beams and columns. Cold formed steel is used very little in developing countries like India, where the market for traditional hot rolled steel sections is still growing. However, cold formed built-up sections can be employed for a variety of applications where spans are minimal and there are few active loads if they are produced effectively. This work examined the structural behavior of cold formed sections depending on various fastening types. We compare and analyze the behavior of cold-formed sections that are primarily supported by bolts and welding. It was investigated how different types of fasteners and their connection methods affected the strength of cold-formed sections. According to studies, changing the type of fasteners led to appreciable modifications in the behavior of similar members.

Keywords: Cold formed steel; welding; bolts; connection; plate; axial strength.

1. INTRODUCTION

Cold-formed parts are employed in a variety of contexts, including the building and automobile manufacturing industries. In the case of short span roofs, cold-formed steel is now frequently employed as a substitute material for timber. When long span roofs for industrial buildings are being considered, it can also be used as an alternative to standard hot rolled steel sections. In addition to being lightweight, cold-formed steel provides increased strength, enhanced stiffness, and uniform quality. Due to their ease of connection and speedy installation, bolts and screws are used to create the majority of the structural components of cold-formed steel [1,2]. In general, steel has become an essential material for

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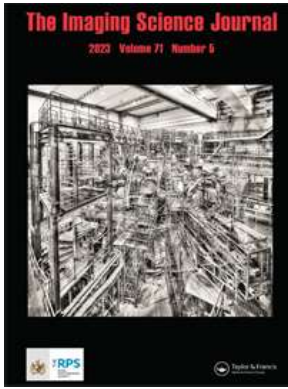
A novel image recognition using Fuzzy C-Means and content-based fabric image retrieval

A. Meenakshi, A. P. Janani, S. Devi Mahalakshmi & S. Vanitha Sivagami

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Original Article

Cloud-based Detection of Malware and Software Privacy Threats in Internet of Things using Deep Learning Approach

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Abstract - The term "cyber-physical system" (CPS) refers to integrating computational and communication capabilities with physical processes. Because of patient data's regulatory and ethical implications, cybersecurity has emerged as a critical issue in the healthcare industry. Because of the sensitive nature of patient information, the layout of CPS models for any large databases requires extra precautions. Protecting user privacy and fending off attacks like spoofing, DoS, jamming, and eavesdropping are essential for cloud storage, which integrates multiple databases to deliver cutting-edge, intelligent services. This manuscript proposes a hybrid deep-learning method for scanning the entire IoT network for malware and pirated software. It is suggested that a Deep learning deep neural network be used to detect source code plagiarism in pirated software. Source code plagiarism is filtered through tokenisation and weighted feature methods, magnifying each token's significance. Next, we use a deep learning method to check for copied code. The data comes from Google's Code Jam (GCJ), and it was gathered with the intention of studying software theft. In addition, malicious infections in an IoT network can be detected by means of colour image visualisation using a deep convolutional neural network. Malware samples from the Maling dataset are used in the experiments. The experimental results show that the proposed methodology outperforms state-of-the-art methods in terms of classification performance when gauging the severity of cybersecurity threats in the Internet of Things (IoT).

Keywords - Cybersecurity, Malware Detection, Normalization, Software Privacy, Tokenization.

I. Introduction

The Power Internet of Things, also known as PIoT, is the smart-grid-oriented Internet of Things that aims to achieve widespread intercommunication, adopting a comprehensive perception and effective data processing between all elements of the power system by capitalising on the advantages provided by advanced technology and data processing techniques [1]. The Industrial Internet of Things (IIoT), currently the biggest and most significant application of the Internet of Things, has brought about the greatest possibility and actively played a role in the ongoing advancements made by Industry 4.0 [2]. The Industrial Internet of Things (IIoT) incorporates Internet of Things technology, communication services, machine intelligence, cloud services, and big data analysis through every stage of the manufacturing process.

The Industrial Internet of Things (IIoT) is an open and extensible system for digital interaction. It enables the transfer of various data types between the industrial devices used in local and wider industrial activities [3, 4]. On the other hand, the enormous amount of data produced by the devices connected to the IIoT has resulted in the emergence of new requirements for the effectiveness and precision of automated, real-time data collecting, monitoring, and processing. In addition, the difficulties associated with maintaining data privacy and security will garner a significant amount of attention [5].

Patient safety is the primary factor to consider when it comes to maintaining the patient's privacy while still adhering to legal and ethical standards. Therefore, the highest possible level of attention needs to be given to the issue of data security during the process of designing CPS structures for medical domains [7,8]. Effectiveness and scalability are essential qualities for database management models. The clinical evidence is relevant to give a sufficient understanding of treatment methods, which is absolutely important to save the user's life, and the data is readily available to the legal, medical director whenever needed.
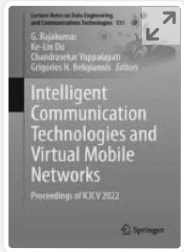
Intelligent Communication Technologies and Virtual Mobile Networks pp 735–744

A Review of Decisive Healthcare Data Support Systems

A. Periya Nayaki ✉, M. S. Thanabal & K. Leelarani

Conference paper │ First Online: 20 July 2022

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Abstract

Health practice has to be accountable not only for expertise and nursing abilities but also for the processing of a broad variety of details on patient treatment. By successfully handling the knowledge, experts will consistently establish better welfare policy. The key intention of Decision Support Systems (DSSs) is to provide experts with knowledge where and when it is needed. Therefore, these systems have experience, templates and resources to enable professionals in different scenarios to make smarter decisions. It seeks to address numerous health-related challenges by having greater access to these services and supporting patients and their communities to navigate their health care. This article describes an in-depth examination of the classical

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In this paper, a 2X2 MIMO array of crossed elliptical-shaped monopole antenna for dual-band application is presented. The proposed single antenna layout consists of two elliptical radiators with 45° inclination on the top layer and a partial stepped-ground plane in the bottom layer. The two layers are separated by rogers substrate with a dielectric constant of 4.5 and a thickness of 1.6 mm. The proposed single antenna produces resonance at 2.46 GHz and 5.17 GHz, with a return loss of 27.64 dB & 33.10 dB and gain of 2.69 dBi & 2.53 dBi respectively. Then the proposed layout is modified to a 2x2 MIMO array with elements arranged perpendicular to each other to decrease mutual coupling among multiple radiators. Additionally, a decoupling structure is utilized in the ground plane to enhance the isolation. A substantial increase in the return loss and low ECC values are observed. Increased gains of 5.23 dBi & 5.32 dBi are observed. The proposed monopole antenna offers dual-band operation with improved gain, making it a more suitable choice for wireless communication systems.

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Abstract:
Many real world activities in computer science scenarios are linked with concurrency and security related issues and have to handle large number of processes to be executed in parallel with false safe security solutions. There are many traditional methods in programming languages to handle concurrency. Concurrency is one of the major issues that need to be addressed by most of the servers when dealing with the group communication operations. Security of the data as well as the credibility of the users are the other aspects when a group of users involve in real-time communication. Many light-weighted servers are designed to carryout elementary operations of request handling, file sharing etc. In design of such servers having large number of clients, the request service handling will be based on the individual server programs. Keeping track of individual credibility and establishing concurrency solutions in server design is challenging. The whole work describes the significance and implementation of an Erlang based XMPP server in comparison with a Python based XMPP server with a view to service the client request handling operations for sending messages, group chatting, buddy-list creation, presence identification integrated with XML messaging pattern as per the XMPP protocol. We also accomplish the security and credibility of the users using a blockchain based interface that keep track of user activities during group communication. The security analysis is also performed for blockchain based interface.

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Blockchain based distributed ledger mechanism has got a wide range of applications in this era. The degree of security measurement is always a bottleneck. Since there are technologies to break it. Data sharing through cloud for smart cities, collaborative actions, remote activities based on the data at the source, etc., need to be secure and free from masquerading and tampering. In most of the cases the data is pushed into the cloud from access points, sensors, or remote access centers. Preventing the data access and identifying anonymous access to these sensors require an enhanced security mechanism that prevents the inconsistent data to be transferred to the cloud. We propose a blockchain based enhanced security system that protects the data from the access point it leaves for the cloud using a distributed ledger. The consensus mechanism ensures the trust of existing sources during the data transfer from the source to the cloud. The trust generated by the subsequent data blocks with the security hash key ensure the integrity of the data and validity of the actual source. This prevent the illegal access to the data sharing points. We have verified the degree of security offered by our proposed model using informal analysis. We found that our method has improved the security of data access.

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An Intelligent Sensor based Automatic Attendance Management System Using IoT

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Abstract—The need for intelligent and distributed monitoring systems based on sensor networks of diverse application systems is growing as a result of the field of industrial control in network applications developing so quickly. It is required to check the body temperatures and attendance when students and staffs visit schools and colleges during this COVID 19 pandemic. A solution is developed here for the purpose of tracking temperatures and attendance management using a smart thermometer without being in contact in order to keep social distance. The person (both staff and student) faces are captured by the ESP32 Camera for training and testing purposes. After the training is over, the ESP32 Micro Controller board registers the student or faculty facial image. For attendance purposes, the MLX90614 IR Temperature Sensor will measure the body temperature of students or instructors. Both the collected data and the email-based attendance notification will be transferred to the cloud using IoT. The message "Please leave the college and take care of your health" will be communicated to the person if their temperature exceeds the threshold level.

Keywords- Attendance Management; ESP32 Micro Controller; ESP32 camera, OLED Display; Arduino IDE; MLX90614 - IR sensor.

I. INTRODUCTION

The Internet of Things (IoT) is a network of physical items that have sensors, software, and other technologies built into them with the intention of connecting to and exchanging data with other systems and devices online. IoT has emerged as one of the most crucial 21st-century technologies [1]. Things like vehicles, thermostats, and kitchen equipment can all be interconnected with people. Seamless connection between people, processes, and things is possible with embedded devices. IoT bridges the physical and digital worlds. Machine-to-Machine (M2M) communication, also known as communication-IoT, promotes connectivity between devices [2]

Face recognition is a combination of computer technology and artificial intelligence [3]. It has emerged as the most difficult subject in this field as a result of its enormously difficult innovation and wide-ranging application possibilities. The smart attendance system often uses biometrics to operate. One of the biometric techniques to enhance this system is face recognition. Facial recognition, a key component of biometric authentication, is widely utilized in a variety of applications, including network security, video surveillance, CCTV footage systems, human-computer interface, and access control systems found indoors [4].

II. RELATED WORKS

Many number of research works related to attendance monitoring system using smart thermometer have been analyzed and some of them are taken here for reference. RFID is a fundamental component of the Internet of Things, and RFID devices are wireless microchips that are used to tag items for automatic identification. Create and build a smart attendance system with the aid of an RFID module and

High Performance Computing Model for Real-Time Online Credit Card Fraudulent Identification Using ESVDS and SPSO

KAVITHA. P [1,*], SELVAKUMAR.S [2] , S.P. Raja [3]

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Abstract: *Current advancements in the communication over networks and e-commerce section have led to considerable raise in the usage of credit cards for all type of transactions, including those conducted online and even in traditional stores. But duplicitous credit card communications have steadily increased, causing commercial institutions to lose a lot of money on yearly basis which reduces the turn-over. The creation of efficient fraud detection techniques is essential to minimize these losses; yet, doing so is difficult as it is extremely uneven in nature because of the majority of credit card datasets. Furthermore, utilizing traditional data mining algorithms for credit card fraudulent revealing is ineffective owing to its architecture, which entails a fixed mapping of variables from input sets with the output set of vectors. Using a Ensembles of Neural Network (NN) classifiers and hybridized information re-sampling strategy, this research presents a scheme that is both effective and efficient for identifying fraudulent use of credit cards. The ensemble classifier is produced using Enhanced Support Vector Data Sphere (ESVDS) and Stochastic Particle Swarm Optimization (SPSO) model as the basic learner in the cat boosting strategy. By combining the SMOTE-Synthetic Minority Over-sampling Technique with the Edited Nearest Neighbor (ENN) technique, the hybrid re-sampling is accomplished. Proposed model overtakes other algorithms in experiments using data from Brazilian banks and UCSD-FICO. Since the issue of data discrepancy was solved using a hybrid approach, making it more robust in identifying unobserved fraudulent transactions.*

Keywords: *Catboost; credit card; data imbalance; ensemble learning; risk analysis; meta-heuristics*

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I.   Introduction

There will be a growing dependence on internet access as the world moves closer to a cashless civilization. The consequences of losses experienced online cannot be understated. Utilizing Virtual Private Network (VPN), sending victim's information over the browser; other difficult-to-detect methods are instances of identifying obscuring techniques. Once a cardholder's identity has already been acquired, scammers may use the credentials individually or sell them to others, as is the case in India, where the identity of the cardholder for almost 70 % of the population has already been sold on the black market [1]. When a major credit card theft attack hit the UK recently, it cost the country's economy GBP 17 million in totals. A network of international crooks stole 32,000 credit and debit card details in the 2000s [2]. The largest fraudulent transactions in history are thought to have occurred in this instance. As a consequence, credit card theft costs the economy billions of dollars [3]. Both cardholders and card issuers are assured of reliable operation. Contrary to belief, scammers want to make cardholders & financial companies believe that the fraudulent transactions were legitimate. Additionally, some likely to be fraudulent happen regularly for the financial benefit even when card issuers or consumers are unaware of them. Both approved organizations and consumers are occasionally unaware of fake credit card charges. Detecting fraudulent activity among hundreds of genuine transactions is difficult, particularly if false activities are substantially smaller [4].

Predictive analytics, data gathering, and modeling systems that integrate grouping and anomaly detection assist avoid financial crimes [5]. Most of these techniques need the use of other machine learning algorithms, particularly unsupervised and supervised ones that may be helpful in malware detection [6]. When attempting to identify every instance of theft, however, these machine-learning systems face innumerable obstacles [7]. Standard assessment measures must have the highest values in the effective model for machine learning. To achieve this ideal form, several changes are required in this field. The difficulties in detecting

Design of Vaccine storage and transportation in remote areas

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ABSTRACT: Vaccination can not only effectively protect individuals from infectious diseases, but also effectively prevent the spread of infectious diseases. The storage and transportation of vaccines have very high requirements on the environment. This project designs an intelligent vaccine storage and transportation system. The system has the functions of process monitoring, storage and transportation traceability, temperature control and vaccine transfer. It combines software and hardware, and is suitable for remote areas. It aims to provide "last mile" service for children who need vaccination in remote areas. Vaccination is the assured way of gaining immunization against many life-threatening diseases. However, the vaccine outreaches in developing and undeveloped countries are very limited due to lack of proper management of the cold chain system. This paper presents a real-time data-centric cold chain monitoring system for the continuous monitoring of the vaccine distribution and transportation process. The proposed system provides the unique feature of creating and managing individual trips for vaccine transportation process along with the regular supervision of temperature and humidity of the carrier. Moreover, the hardware and software components for the system also track the location of the carrier. This proposed system can be particularly highly effective in increasing vaccine coverage in the remote regions. This is because the proposed system enables the remote monitoring of the entire process and ensure transparency in the distribution process..

KEYWORDS: Internet of things, Sensor, ESP-8266, cold chain monitoring

I. INTRODUCTION

In recent years, the integration of Internet of Things (IoT) technology in various applications has been gaining popularity, including the management of public toilets in societies. IoT-enabled monitoring and controlling systems have emerged as a promising solution for addressing the challenges associated with the maintenance of public toilets in societies.

Immunization by vaccines is widely acknowledged for controlling and eliminating a large number of infectious diseases and is also one of the most cost-effective public health interventions. According to UNICEF, vaccines are saving 2-3 million lives every year. However, vaccine outreach is still very limited in the developing and undeveloped countries. In 2018 alone, 13.5 million children did not receive routine immunization and 1.5 million lives are lost every year from diseases that can be prevented by vaccines.

[1]. Even though different factors are responsible for this low outreach of vaccines, breach of the vaccine cold chain is the biggest contributing factor.

[2]. Vaccines are extremely sensitive to temperatures. The World Health Organization has fixed the temperature range for vaccine storage and transportation as 28°C and vaccines completely lose potency if they are exposed to temperatures beyond this range even for short durations. This is why maintaining the cold chain system from the point of manufacture till the point of administration is very important. However, various physical, geographical and socio-economic factors in the developing countries hamper the smooth management of the vaccine cold-chain system resulting in the loss of almost 50% vaccines annually.

[3]. WHO has a number of standardized devices and guidelines for monitoring the cold chain; but in the undeveloped countries, about 31% of these devices were non-functional and several of the units were too old for use.

[4]. Most of the people in the undeveloped and developing countries are not sufficiently trained for

Threat Detection Using Rf Algorithm

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ABSTRACT:Due to the advance of information and communication techniques, sharing information through online has been increased. As a result, various online services were created. However, as increasing connection points to the internet, the threats of cybersecurity have also been increasing. Threat Detection have nowadays become a necessary component of almost every security infrastructure. Threat detection plays an important role in ensuring information security, and the key technology is to accurately identify various attacks in the network. Analyzing network flows, logs, and system events has been used for threat detection. Network flows, logs, and system events, etc. generate big data. Big Data Analytics can correlate multiple information sources into a coherent view, identify anomalies and suspicious activities, and finally achieve effective and efficient intrusion detection. In this project,an TDS(Threat Detection System) with Machine learning algorithms in Big Data Analytics was developed.It is based on Random Forest (RF) Algorithm which is an ensemble classifier and performs well compared to other traditional classifiers for effective classification of attacks. To evaluate the performance of our model, experiments on KDD99 data set was conducted.

KEYWORDS: Cybersecurity,Threat Detection,Big Data Analytics, KDD99 .

I. INTRODUCTION

Threat Detection System (TDS) solutions excel in monitoring network traffic and detecting anomalous activity. They are placed at strategic locations across a network or on devices themselves to analyze network traffic and recognize signs of a potential attack. The TDS works by looking for the signature of known attack types or detecting activity that deviates from a prescribed normal. It then alerts or reports these anomalies and potentially malicious actions to administrators so they can be examined at the application and protocol layers. This enables organizations to detect the potential signs of an attack beginning or being carried out by an attacker.

In our project, the Threat Detection System (TDS) based on Machine Learning predicts the network attacks such as DOS, probe, U2R, R2L with highest accuracy. It uses RF (Random Forest) Algorithm. It is one of the powerful methods of supervised machine learning algorithm which improves the accuracy in the classification of attacks compared to other classifiers. Experiments on KDD99 data set will be conducted to evaluate the performance of the system.

In our project, we use Random Forest Algorithm. It is one of the popular supervised classification algorithms which can be used in python. Random Forest is a powerful and versatile supervised machine learning algorithm that grows and combines multiple decision trees to create a forest. A decision tree is another type of algorithm used to classify data.

[1]. Ajith Abraham et al presented some of the computational intelligence paradigms which could be useful for designing accurate intrusion detection systems which could be also deployed in a distributed environment.Computational intelligence approaches for intrusion detection was first implemented in mining audit data for automated models for intrusion detection.Raw data is converted into ASCII network packet information, which in turn is converted into connection level information. These connection level records containconnection features like service, duration etc. Besides several machine learning techniques and artificial immune systems, several intelligent paradigms have been explored to create models to detect intrusions. Artificial neural networks (ANN) have been used both in anomaly intrusion detection as well as in misuse intrusion detection. Support vector machines (SVM) have proven to be a good candidate for intrusion detection because of its training speed and scalability. Multivariate Adaptive Regression Splines (MARS) is an innovative approach that

An IOT Enabled Wireless Greenhouse Monitoring System

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Abstract— Our project's main aim is to increase food production, economic development in rural communities, environmental sustainability of food production through our proposed work. The paper proposed is a wireless greenhouse monitoring system that utilizes a Supervisory Control and Data Acquisition (SCADA) application and an Arduino UNO microcontroller board. The system aims to provide real-time monitoring of the greenhouse environment using various sensors, including temperature and humidity sensors, gas sensors, and level sensors. The data collected from these sensors is transmitted wirelessly to a central SCADA system that displays the data and allows for remote control of the greenhouse environment. The system's key features include its ability to control the greenhouse's environment remotely, increasing efficiency, and reducing manual labour. The data collected by the sensors can be used to optimize the greenhouse environment, allowing for better plant growth and increased productivity. The system also features cloud storage, allowing for easy access and analysis of the controlled and monitored data. This wireless greenhouse monitoring system provides a convenient and efficient method for monitoring and controlling the greenhouse environment, allowing for increased productivity and better management of resources. Additionally, the system is cost-effective and easy to install, making it accessible to small-scale greenhouse farmers. The proposed system can be utilized in a wide range of greenhouse applications and is an excellent tool for those seeking to optimize their greenhouse's productivity and sustainability.

Index terms: Internet of things, Sensor, Arduino Uno, SCADA.

I. OVERVIEW

A wireless greenhouse monitoring system is a system that uses wireless technology to remotely monitor and control various environmental parameters in a greenhouse, such as temperature, humidity, water level. The system typically consists of sensors that are placed in the greenhouse to collect data, a wireless communication network that transmits the data to a central control unit, and a software application that allows the user to view and analyse the data and control the greenhouse environment. The advantages of using a wireless greenhouse monitoring system include increased accuracy and reliability of data collection, reduced labour costs associated with manual data collection, improved control over greenhouse conditions, and the ability to remotely monitor and control the greenhouse from anywhere with an internet connection. Wireless greenhouse monitoring systems can be customized to meet the specific needs of the user, and can be integrated with other automation systems, such as irrigation. They can also be used in a variety of greenhouse settings, including commercial greenhouse operations, research facilities, and hobby greenhouses. A wireless greenhouse monitoring system provides a powerful tool for growers to optimize their greenhouse environment and improve plant health and productivity.

II. INTRODUCTION

In recent years, the integration of Internet of Things (IoT) technology in various applications has been gaining popularity, including the management of public toilets in societies. IoT-enabled monitoring and controlling systems have emerged as a promising solution for addressing the challenges associated with the maintenance of public toilets in societies.

A wireless greenhouse monitoring system is an innovative and efficient way to monitor the environment within a greenhouse. The system utilizes a variety of sensors and communication technologies to gather data and transmit it to a centralized location for analysis and management. Greenhouses are used to grow a wide range of plants, and maintaining optimal environmental conditions is critical for successful growth. This includes monitoring temperature, humidity, light, and air quality, as well as water and nutrient levels.

Traditional greenhouse monitoring systems rely on manual measurements and adjustments, which can be time-consuming and prone to error. Wireless greenhouse monitoring systems, on the other hand, allow for real-time monitoring and control, providing a more accurate and efficient way to manage the greenhouse environment.

Wireless greenhouse monitoring systems typically consist of a network of sensors distributed throughout the

BREAST CANCER PREDICTION AND ANALYSIS USING XCEPTION MODEL

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ABSTRACT

One of the top causes of death in the globe is Breast Cancer (BC). Globally, breast cancer will claim the lives of about 10 million people in recent years. Breast Cancer is a devastating illness that affects a lot of women worldwide. It comes up at number four among cancers that are fatal, including colorectal, cervical, and brain tumors. Furthermore, it is predicted that over the next 20 years, there will be a 70% increase in the number of new instances of BC. As a result, improving the diagnosis and increasing patient survival from 30 to 50% depends greatly on early identification and accurate diagnosis of BC. Deep learning plays a crucial role in handling and reviewing a large number of X-ray, MRI, and computed tomography (CT) images thanks to advancements in healthcare technology. This study's objective is to suggest a deep learning model for identifying and categorizing breast tumors. Benign adenosis, benign fibroadenoma, benign phyllodes tumor, benign tubular adenoma, malignant ductal carcinoma, malignant lobular carcinoma, malignant mucinous carcinoma, and malignant papillary carcinoma are the eight kinds of cancer that make up breast cancer. The dataset was gathered from the Kaggle repository for the identification and categorization of BC. F1-score, recall, precision, and accuracy are among the measurements that were taken into consideration when evaluating the proposed model. The preprocessed dataset was used to train, validate, and test the suggested model.

Keywords: Breast cancer; deep learning; xception; GAN; VAE

1. Introduction

The second biggest cause of death for women is BC (after lung cancer). As per the Globocan data 2020, in India, BC accounted for 13.5% (178361) of all cancer cases and 10.6% (90408) of all deaths with a cumulative risk of 2.81. BC is one type of cancer that starts in the breast.. When cells start to multiply uncontrollably, cancer develops. Breast cancer cells frequently cluster together to create a lump or an x-ray-visible tumour. When cancer cells enter the blood or lymphatic system and are transported to other parts of the body, BC can spread. A DNA alteration or mutation is one of the causes of breast cancer . A more precise classification of benign tumours could spare people from receiving unneeded medical care. As a result, there is extensive research into the proper BC diagnosis and the classification of individuals into benign or malignant categories.

2. Literature Review

(Basem S. Abunasser et al, 2022) proposed a theory on Breast Cancer Detection and Classification using Deep Learning Xception Algorithm to improve the speed and accuracy of breast cancer diagnosis.The model comes with the benefits of shorter training time and its possible to deliver better results. The objective of this study is to propose a deep learning model for detecting classifying Breast Cancer.Xception model was used and customized to fit our current breast cancer eight classes dataset. The Dataset was collected from Kaggle and boosted using GAN. The dataset was split into three datasets: training, validating and testing. The customized Xception model was trained, validated, and tested.The measurement that was used in the evaluation of the proposed model includes: F1-score, recall, precision, accuracy. The

Sharing Personal Health Data by Blockchain with Cloud Storage Technologies

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Abstract—The development of wearable technology and mobile computing leads to the generation of huge amounts of personal data. Every second, many data related to health is being created and amassed continuously. As these personal datasets include important information about the users, they have to be treated as an asset for these users. Also they have to be controlled and managed by the person who generated those data. Many service providers have been established to manage these datasets and to keep them safe. These service providers project the problems for data security and prevent data exchange. These individual health records are very important sources. In this paper, we exhibit a theoretical approach for sharing continuously dynamic personal health data leveraging block chain technology and cloud storage to share health-related data in an open and secure way. In addition, to have control over data quality, we also develop a data quality inspection module based on machine learning approaches The proposed system's main objective is to give users the ability to possess, manage and share their personal health data in a secured way that go along with the General Data Protection Regulation (GDPR) additionally, it gives users of commercial data and researchers an effective approach to get high-quality personal health data for both of those things.

INTRODUCTION

People and technology have become inseparable as they were using various kinds of smart devices like smart phones, smart watches, smart bands. These devices use various health-related applications such as remote diagnosis. We have to be grateful to the rapid development of mobile computing , wearable technology and wireless sensing. This helps us to monitor diseases and to look after elderly person as it predicts the disease earlier and make people health conscious. These devices provide a significant amount of data on a person's health, and this data is useful for both academic and commercial healthcare research. proper sharing of personal health data by the patients, researcher's, business's and also by the entire public health care system is always important Health data should be owned and managed by the respective users themselves as a personal asset but in practise they are frequently managed by various service providers, device manufacturers, or dispersed across several healthcare systems. As these centralised data warehouses and authority providers are desirable targets for cyberattacks, it generally creates obstacles for data sharing and

compromises data security and privacy. Due to cryptocurrencies, the blockchain technology has significantly increased in popularity in recent years, particularly in the financial sector. For instance, since its initial introduction in 2008. Bitcoin has drawn interest from the research community across a range of academic disciplines and has become widely accepted because of its distinctive features, such as lack of control which is centralized, an assumed high of innominateness and distributed consensus over decentralised networks. Multiple parties' cooperation is prerequisite for the decryption of the data. With that cooperation blockchain solutions could reduce the risks of data breaches. This is also possible by using threshold encryption of data combined with public key framework. The blockchain-based data sharing system might significantly streamline the process of acquiring data for research and commercial initiatives and give users the chance to acquire ownership and privileges over their own data and profit from them. Additionally, it provide greater data control to help the user to keep an eye on all the actions using those data. The purpose of this paper is to put forward the significance of sharing personal health data based on blockchain and cloud

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(C-R) NN MODEL FOR DETECTION OF SCHIZOPHRENIA

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ABSTRACT

Schizophrenia is a mental condition that can cause long-term disability and is characterized by cognitive deficits and hallucinations. EEG readings, which represent the condition of the brain, are frequently used to detect schizophrenia. Typical manual processes in traditional machine learning methods include feature extraction, feature selection, decomposition, and classification. To get around the drawbacks of feature extraction-based methods, this article suggests an automated method for diagnosing schizophrenia utilizing recurrent neural networks (RNN) and convolutional neural networks (CNN). EEG readings were utilized to construct a convolutional neural network (CNN) model, which was then used to categorize patients as having schizophrenia or being healthy. In this study, CNN's DenseNet model was used to create a specific application. The DenseNet model was used to get 86.36% accuracy. A Recurrent Neural Network (Long Short-Term Memory) model was proposed in the following section of the article to automatically identify relevant features and diagnose schizophrenia using EEG signal data. With the entire feature set, this model has a 98% accuracy rate, respectively. Better than conventional machine learning classifiers is the proposed model. With the Basic sensory tasks dataset from schizophrenia patients, the suggested model demonstrated that the RNN-LSTM had superior accuracy than CNN and RNN.

Keywords: Schizophrenia, Convolutional neural network, DenseNet, Recurrent neural network, Long Short-Term Memory.

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Weighted Moth-Flame Optimization Algorithm for Edible Oil Quality Detection Using Microwave Technologies

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Abstract

Edible oil acts as an essential part in diet and nutrition, and it is important for a healthy life. Edible oils are susceptible to quality degradation, due to decomposition and microbial decay, which causes nutritional loss and undesirable effects. Consumption of unhealthy edible oil creates hazardous health effects such as dementia, heart-related disorders, cancer, Alzheimer's, and Parkinsons diseases. The food safety concern has increased globally, and there is a need for food quality analyzing system. Chemical methods have been widely used to measure the quality of edible oils but the chemical methods consume more time for evaluating the quality of edible oil, and the oil ingredients are changed, due to chemical reactions. This research work proposes a non-destructive technique, which is based on microwave technologies and deep learning methods to measure the quality of edible oil. The waveguide method at 8-12 GHz frequency to measure the microwave parameters such as attenuation constant, dielectric constant, dielectric loss factor, penetration depth, and permittivity of edible oils. The experimental methods use horn antenna, isolator, frequency meter, and microwave detector. The microwave parameters are utilized to train the deep residual network (DRN). The DRN training algorithm is designed by using proposed weighted moth-flame optimization (WMFO) algorithm. The proposed method (i.e., WMFO-DRN) is compared with four well-known techniques, such as cat swarm optimization (CSO) algorithm, particle swarm optimization (PSO) algorithm, genetic algorithm, and gray wolf optimization (GWO) algorithm. The experimental results validate that proposed WMFO algorithm is very aggressive and achieve maximum accuracy of 0.911, sensitivity of 0.916, and specificity of 0.906.

Introduction

Food nutrient standard and food constituents are the essential parameters in food processing industry. Microwave technology is a nonintrusive method which is an acceptable tool for measuring the quality of edible oil in food industry. The food industry sector needs more technological revolution for monitoring the quality of food to face the current challenges (Clairand et al. 2020; Furstenau et al. 2020; Lam et al. 2020). Microwave-assisted pasteurization system has been developed to ensure the quality of packaged foods (Hong et al. 2021). The analysis has been performed by using single-mode microwave system and by changing the temperature of the packaged foods. The quality and safety attributes of foods are analyzed by hyper spectral imaging technology, which is a non-destructive method of testing (Wudi et al. 2013). The hyper spectral imaging method has the capability to monitor a food product's intrinsic chemical and molecular data as well as its physical and morphological properties. In

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RESEARCH ARTICLE

ALMEGA-VIR: face video retrieval system

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ABSTRACT

The limitations of Content Based Video Retrieval (CBVR), such as large pools of video data, selection of features, limited processing capacity, and content-related issues, can be overcome by Deep Belief Neural Networks (DBNs). The search engine does the processing, and the results are effectively returned to the users. The deep learning model also has some comparable challenges to be solved at various levels. Typically, the selection of frames is one of the most essential tasks for a face retrieval system which is efficiently accomplished by using deep learning models. Also, the performance of recognition models highly depends on the selection of frames that include both low-level and high-level features from the given video sequence. This paper proposes ALPHA-TO-OMEGA (ALMEGA-VIR) Visual Information Retrieval scheme that analyzes the contents of the video file for a particular face and retrieves the user's relevant videos. VIR aims to solve the challenge of locating relevant pictures and videos based on a query. VIR can be based on text-based search, content-based search, and Mixed based search. VIR here focuses on content-based search approach. The YouTube Celebrities (YTC) dataset, the Youtube Face (YTF) dataset, and Honda / UCSD dataset are used in this work. The used dataset addresses issues such as illumination changes, occlusion, rotation, and scale. We propose an ALMEGA-VIR framework for visual novelty face identification for specific investigation and evaluation. The classification accuracy of the proposed ALMEGA-VIR model shows that 4% is more effective than traditional classifier algorithms such as SVM, Naïve Bayesian classifier, MLP and Random Forest classifier. A comparative study is also implemented with other existing works to check the superiority of the proposed method.

Introduction

In recent days, the video-based face recognition system has gained significant attention due to its increased advantages in law enforcement, security, and show business. But, extracting the videos from the large repositories is one of the complex tasks, because of the huge information storage. Also, content-driven recovery is the key element of searchable video repositories, which intend to satisfy the user's requirements with the help of audio, visualization, and text indicators. Specifically, the content-based retrieval system helps the computers depict the information correctly and retrieve the clips by describing the semantic contents of videos. Nowadays, all public sectors like shopping malls, railway stations, banks, and airport surveillance have distinct cameras for capturing the behaviour of the public. Then, the computer user can search the videos according to single and multiple user queries. In the computer vision applications, the human face recognition [1–6] is considered as one of the challenging tasks and the appropriate recognition system helps one to examine the face images over the videos. For this purpose, various face detection algorithms have been used,

but they face problems like facial expression changes, head poses, the presence or absence of facial features, blurriness of the face, darkness of the face, and occlusion. Hence, it is more essential to design a fully automatic face detection algorithm for solving the problems of changes in pose, lighting, and expression. Moreover, the visual attributes such as colour, shape, and texture are derived from the video sequence for improving the performance of face recognition system [7–12]. In addition to that, some other metadata, like title, length, and record format, are also used for improving the detection efficiency of the face recognition system. Yet, it limits the problems of potentially misleading synonym use. Generally, synonyms and homonyms are words with the same spelling, pronunciation, and different meanings. Then, user contentment is also considered an important aspect of the retrieval system. Still, developing a user-friendly system that supports even novice users is very challenging. The content-based retrieval system detects the structure of raw materials for a better understanding of specific shapes, textures, or colours. Furthermore, the retrieval time is considered the key element of the video recovery system,

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An energy efficient deep learning model for intrusion detection in smart healthcare with optimal feature selection mechanism

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Abstract. In healthcare (HC), Internet of Things (IoT) integrated cloud computing provides various features and real-time applications. However, owing to the nature of IoT architecture, their types, various modes of communication and the density of data transformed in the network, security is currently a critical issue in the IoT healthcare (IoT-HC) field. This paper proposes a deep learning (DL) model, namely Adaptive Swish-based Deep Multi-Layer Perceptron (ASDMLP) that identifies the intrusions or attacks in the IoT healthcare (IoT-HC) platform. The proposed model starts by clustering the patients' sensor devices in the network using the Probability-based Fuzzy C-Means (PFCM) model. After clustering the devices, the cluster heads (CHs) among the cluster members are selected based on the energy, distance and degree of the sensor devices for aggregating the data sensed by the medical sensor devices. The base station (BS) sends the patient's data collected by the CHs to the cloud server (CS). At the cloud end, the proposed model implements an IDS by applying training of the DL model in publicly available databases. The DL approach first performs preprocessing of the data and then selects optimal features from the dataset using the Opposition and Greedy Levy mutation-based Coyotes Optimization Algorithm (OGCOA). The ASDMLP trains these optimal features for the detection of HC data intrusions. The outcomes confirm that the proposed approach works well on real-time IoT datasets for intrusion detection (ID) without compromising the energy consumption (EC) and lifespan of the network.

Keywords: Smart healthcare, Internet of Things (IoT), intrusion detection system, deep learning, healthcare security

1. Introduction

The variety of interconnected devices and the IoT have increased dramatically in recent years [1]. The IoT is a network of interconnected sensors, smart devices, and embedded computers that process, store, and communicate heterogeneous data [2]. IP addresses are assigned to such objects in order to identify the devices. Thus they can transmit and receive data over a network without human intervention [3]. IoT technologies include travel, agriculture, smart cities, emergency responders, and infrastructure. The HC industry is one of the most critical fields for Artificial Intelligence applications [4]. The physical devices collect vital signs using a variety of sensors and transmit real-time data to the medical team by connecting to the internet, making it a significant and necessary source of medical data [5]. Although there are many advantages to the Internet of Medical Things (IoMT) eco-system, it is also a potential target for various new cyber threats and attacks

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A Contemporary approach to review clustering algorithms in wireless sensor networks

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Abstract. Improving the network lifetime is a major concern in wireless sensor networks (WSNs). Due to the limited energy capacity of the sensor nodes, wireless sensor network faces several challenges for improving the lifetime. Clustering is the influential technique used to minimize the energy consumption of the sensor nodes. Researchers have developed lot of clustering algorithms with unique features and challenges. First, this paper begins with the discussion of the clustering characteristics of the different approaches in detail and the radio model used. Further, the survey of the clustering algorithms which is classified into two categories: Traditional and computational based is presented and performance comparison is given according to the requirements of the WSN like energy efficiency, scalability, delivery delay and link quality.

Keywords: Wireless sensor networks, clustering, network lifetime, traditional, computational intelligence

1. Introduction

Technological advancements in low power design provide the opportunity to develop micro sensors which work in a collaborative way to monitor the physical parameters of an environment and send the information to the central base station. Wireless sensor networks are one of the promising technologies now-a day and have attracted considerable interest of the research community and the industry.

WSNs possess excellent features which lead to the development of many applications like environmental monitoring, border protection, and battle field and security surveillance.

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Wireless sensor networks are composed of a large number of tiny sensor nodes, which is equipped with a low power battery. Sensor nodes' energy is draining very quickly during operation. It is not possible to recharge or replace batteries in all kinds of circumstances. The power saving is an open hard issue in WSNs. In the literature, the energy conservation in sensor nodes is dealt at specific stages like Data aggregation, scheduling of sensor states, transmission power control, medium access protocol, routing [65].

Clustering is an efficient topology control technique to minimize the energy consumption of the sensor nodes [19]. In clustering, the network nodes are arranged in clusters and cluster head (CH) is elected for each cluster. A sensor node in each cluster transmits their data to their respective CH and the CH aggregate data and forwards them to the base station (BS) as shown in Fig. 1. The fact that only the CH

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Chicken Swarm Optimization Based Optimal Channel Allocation in Massive MIMO

S. Nisha Rani[1] · **G. Indumathi[2]**

Abstract
Energy efficiency (EE) plays a significant role in the progress towards the Fifth-generation (5G) wireless communication networks. Massive multiple-input multiple-output (MIMO) is a viable concept for the 5G networks due to the greater SE and EE. In this work, a Channel Selection (CS) scheme is proposed by selecting the optimal channel using the Chicken Swarm Optimization (CSO) algorithm. A massive MIMO model is implemented by considering the SE and EE. The main objective is to optimize the beam-forming vectors and power allocation for all the users. The multi-objective function can be defined to develop an effective and robust design with balanced SE and EE. The objective function for generating the optimal beam forming vectors is satisfying the signal to interference-plus-noise ratio (SINR) constraints. Based on the channel characteristics, the CSO Algorithm is used to produce the beam-forming vectors and power distribution. A projection matrix with a channel estimating framework is created once the channel state information is predicted. The selection of the index sets in the iteration process provides the optimized channel. Data transmission is performed through the optimal channel. According to the comparison analysis, the suggested CS scheme offers superior SE and EE to the existing CS schemes.

1 Introduction

Based on the rising demand for multimedia applications, there has been a lot of attention paid to enhancing the SE and EE of wireless communication systems in the last ten years. Massive MIMO is the ideal paradigm for 5G networks due to its high SE [1] and EE [2, 3]. The primary goal of Massive MIMO is to increase throughput and SE by outfitting Base Stations (BSs) with numerous antenna components at the transmitter and receiver and

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RESEARCH ARTICLE

WILEY

Optimum design of planar quasi-Yagi antenna for wearable Internet of Things (IoT) applications

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Abstract

This paper presents the design of a novel dual-band quasi-Yagi antenna for on-body communications. The proposed antenna is designed on 0.05 mm thin microwave laminate and is designed to cover the 2.45 and 3.5 GHz spectrum to meet the needs of on-body Internet of Things networks. Microstrip to slot-line transition is used for the excitation of the feeder element. The conventional feeder of the quai-Yagi is replaced with F-shaped radiators to obtain a dual-band response. In addition, a pair of directors are used to enhance the antenna gain. The proposed quasi-Yagi antenna is optimized using the spider monkey algorithm. The chosen algorithm is used to synthesize the dimensions of the dual-band radiator and is preferred to obtain quick convergence, unlike the traditional optimization algorithms. The optimized planar quasi antenna offers 5% bandwidth in both operating bands with a measured gain of 5.7 and 5.8 dBi, respectively. The optimization time is also considerably reduced in comparison with traditional optimization algorithms. The simulated and optimized antenna is fabricated and tested.

KEYWORDS

dual-band antennas, IoT antennas, optimization algorithm, wearable antennas

1 | INTRODUCTION

Optimization of antenna parameters using high-fidelity electromagnetic simulators has always been a research interest. Conventional deterministic optimization algorithms are replaced with meta-heuristic algorithms which are mostly nature-inspired and help to achieve reliable results in a short duration. The choice of meta-heuristic algorithms is attributed to the nonavailability of gradient solutions to the antenna problem which is in general considered to be complex. Given the number of optimization parameters and the design targets, the time consumed to achieve faster convergence becomes limited. Given the scenario, this paper is attempted to design and optimize a dual-band Yagi-antenna to suit the needs of on-body Internet of Things (IoT) communications. The Yagi-antenna is chosen for two reasons, namely, limited number of design variables which helps in achieving faster convergence and Yagi-antennas produce unidirectional radiation patterns along the body surface.

Some of the interesting developments made in the optimization of antennas are the use of a multiobjective algorithm[1] which reduces the search space while improving the computational speed. The multiobjective algorithm has been successfully used in the design of narrow-band antennas[2] and miniaturized ultra-wideband antennas.[3] A global search optimization algorithm is explored to design a wideband omnidirectional log-periodic antenna in

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Solar Photovoltaic System Performance Improvement Using a New Fault Identification Technique

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CONTENTS

Abstract—Identifying faults in the photovoltaic (PV) arrays is very much essential in improving the PV system's safety and reliability. Solar PV arrays operate with non-linear characteristics, installed with maximum power point trackers (MPPT's), and blocking diodes cause mismatch levels. Line-to-line and line-to-ground faults are identified, and the faulted circuits are isolated by means of over current protection devices (OCPD) and ground fault protection devices (GFPD). In order to improve the accuracy of fault detection, artificial intelligence (AI)-based techniques like Fuzzy inference, wavelet, support vector machine, and k-nearest neighbors are used. The drawback of AI-based techniques are (1) requirement of large dataset for effective fault identification and also show incompatibility if there is low irradiation and (2) require a larger number of voltage and current sensors. An experimental setup of 160 W, 4×4 solar PV array having PV modules (SPB) is subjected to different fault conditions (CS), and the faults are identified using the minimum number of sensors. The faults that are not detected by the conventional methods are detected using this proposed method, and the power gain due to the fault identification is around 152% which is 97 W in the PV array.

1. INTRODUCTION

Photovoltaic (PV) arrays are equipped with over current protection device (OCPD) and ground fault protection devices (GFPD) for identifying line-to-line faults and line-to-ground faults. PV arrays under uncertainties like (1) low irradiance, (2) mismatch levels, (3) operating in non-linear characteristics, and (4) the presence of active maximum power point trackers (MPPTs) result in the injection of ripple current of high frequency and make the protection devices fail to detect the faults in a PV array [1–7]. It is possible that if the array fault is not detected in time, high power losses and also fire hazards will occur [8–11]. As a PV array is in partially shaded condition, it exhibits the

RESEARCH ARTICLE

Experimental study of bifacial photovoltaic module with waste polyvinyl chloride flex and acrylonitrile butadiene styrene road side safety sticker as an alternative reflector: optimization using response surface methodology

Hariharasudhan Thangaraj[1] · Prince Winston David[1] · Gurukarthik Babu Balachandran[1] · Pravin Murugesan[1]

Abstract

Bifacial photovoltaics (PV) are gaining rapid attention and their ability to generate more electricity is accelerating their deployment globally. However, literature on optimal bifacial PV is presented for the installation parameters of the system. In this study, we use response surface methodology (RSM) to investigate the flex and roadside reflector wastes as alternate reflectors for bifacial PV modules by using a statistical model. Our primary objective in this study is to examine the significant influence of key input factors (front irradiation, rear irradiation, temperature, thickness, and height) on the irradiance factor, total solar reflectance, and power extracted. The results show that the power extraction of the bifacial PV module using the waste flex material is 9%, higher than that of the road side sticker waste. The result indicates that among all other input factors, front irradiation is the most significant parameter.

Keywords Bifacial photovoltaic module · Polyvinyl chloride flex waste · Acrylonitrile-butadiene-styrene road side sticker waste · Power extraction · Irradiance factor · Total solar reflectance

Introduction

In the today's world, there is a rapid increase in plastic waste, with a growth rate of about 300 million tonnes every year, but only about 3% or less is recycled. Acrylonitrile–butadiene–styrene (ABS) and polyvinyl chloride (PVC) are the most widely used plastic materials. A huge amount of ABS and PVC wastes are generated world-wide. A major part of the research focuses on waste recycle and reuse. Bala and Mondal (2020) studied the optimization of municipal solid waste for biogas production by using response surface methodology (RSM). It was determined that the optimal conditions by RSM were sodium hydroxide (NaOH) dose of 4.72 g/L, temperature 180 °C, and time 30.3 min, which led

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to a 169.5% increase in biogas production. The production of soluble chemical oxygen demand from waste activated sludge by optimization using RSM. It was predicted that an optimum condition will be achieved with suspended solids (SS) of 8.0 g/L, an initial oxidation–reduction potential (ORP) of 144.0 mV, and a shaking rate of 60.0 r/min (Wang et al. 2019). To increase the dielectric strength, the peel of *Phaseolus vulgaris* fiber (waste) was used for the preparation of a composite. The optimization of the composite was done through face centered central composite (Gurukarthik Babu et al. 2021). A study was conducted on the treatment of slaughterhouse wastewater using electrocoagulation and electro-flotation and the importance of electrode optimization (Akarsu et al. 2021). Through a pyrolysis process, the styrene is recovered from waste polystyrene (WPS) with the temperature of 470–505 °C, heating rate of 40 °C/min, and a carrier gas flow rate range of 115–140 mL/min, recovered the styrene with 64.52% (Mo et al. 2014). The yield water productivity was influenced by the solar radiation, water depth, ambient temperature, and thickness of the insulation, and it was found that the water depth was inversely proportional to the water productivity of solar still (Rejeb

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REGULAR PAPER

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A novel approach to predict competency and the hidden risk factor by using various machine learning classifiers

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ABSTRACT

In a survey conducted in the year 2020, we came to know that India's around 50% of population includes young people of the age group of 25 and students. Guiding this young mass in the right way and strengthening their future is a huge responsibility put over the head of the elder citizens of India such as their parents teachers and professors. This paper aims to build a model that can predict the students' competency level and the risk factors or the fields where he needs to put their effort to improve themselves, and this model also helps the parents, professors and Educational institutes to know about their children's and students in which zone they stand, are they ready to compete with others. This analysis is done by using different ML bifurcation algorithms. Also we aim to find the best classifier which can emerge with the highest predicting accuracy among all other classifiers to the above-said problem. The accuracy of 88.5% is achieved through the proposed machine learning algorithm for particular education datasets which have been taken into consideration.

1. Introduction

The growth and future of the nation directly depend on the youth power present in the country. Strengthening the youth power is nothing but strengthening the nation. Students are the main source of youth power they can be found in institutions/universities, their performance competency plays a major role in the socio-economic growth of the nation which can be achieved by producing graduates with problem-solving attituded, innovators and speculators [1]. So, we focused to begin a quest under socio-economic and psychological attributes that have a major impact on the academic goal. An inept way of training system can untangle by upgrading with crucial scrutinized policies is only the ultimate aim of this study. Speculating the pre-university zone can impart a clear logic of what pupils can achieve in life. Pupils enjoy the phase of adolescence in pre-university examination, this is the intense time they are more firmly fascinated by their environment.

There is a lack of guidance during this phase, if we should properly guide them will definitely drive them from the dark phase of adolescence towards the light space where they can enjoy and build their effective career by having a fabulous academic record track. To predict and build a model that can provide us with statistical proof-based logic, we need to have profound information about the pupils, the only source to accumulate all these data is through the educational

institutes' training centres and other forms of coaching centres. In this study, we mainly focus on pupils who have recently cleared their pre-university exams and are those who are filled with a dream of joining higher courses. To build an effective model there is a need to undergo certain stages, first among them is the pre-processing stage where the raw data have been preprocessed by applying data balancing, normalization and optimal equal width binning form. We have also applied three different dimensionality reduction algorithms that reduce the number of attributes that are used during training. Since we have used several preprocessing techniques, we have comprised our comparative study with the combination of different pre-processing models to derive the best data model for our system.

2. Related work

Final grades are the most important part of students' life to establish their bright careers. In 1993 experiments on Neural networks have been profoundly started by Gedeon and Turner to find out a variety of neural networks such as feed-forward networks and back propagation and also to learn how to use these networks and what kind of problems to use what kind of network, etc. [2]. They started conducting their experiments on the prediction of the final grade system. In the year 2002 Wang and Mitrovic were involved in another kind of

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Non-Intrusive Residential Load Monitoring System Using Appliance: Based Energy Disaggregation Models

Devie Paramasivam Mohan[1] · Kalyani Sundaram[1]

Abstract

With large scale implementation of smart metering technology, the implications demand to account the energy consumption at every node of the system, but the device scalability is of great concern. Energy Disaggregation serves the purpose of finding the appliance level energy consumption from the aggregate energy, which helps to unlock the interactions between the devices through load characterization. This paper proposes a decision tree-based approach for identifying the device operations thereby effectively categorizing the load. A balanced data learning approach is adopted for data processing to eliminate the outliers during training and testing phase of classifier and also improve the classifier performance. The proposed model was evaluated using Reference Energy DisaggregationDataset (REDD) and Retrofit DecisionSupport Tools for UK Homes using Smart Home Technology (REFIT) Dataset. The performance metrics has been obtained for individual appliance using decision tree, naïve bayes and k-nearest neighbor classifiers andanalysed for validation. The proposed disaggregation approach has proven to give promising results in terms of better and accurate detection of appliance operation. The load monitoring system is developed to detect the appliance operation by sensing the voltage, current and power data at defined sampling rate of frequency. Even with large training dataset, the results obtained during testing phase with unseen dataset were viable for further allegations of proposed load model.

Keywords Energy disaggregation algorithm · Appliance model · Non-intrusive load monitoring

1 Introduction

The era of smart grid faces rapid development with growing technologies to facilitate the utilities of the power grid. With growing demand and global warming scenario, energy saving becomes one among the up-to-the-minute discussions of energy sector. Energy saving helps the utility to reduce the overall demand. The smart meter technology enables the user to be aware of their monthly energy usage and the real time feedback of energy consumption helps to have a better and optimal utilization of appliances. For direct load control based Demand Side Management (DSM) strategy, the utility faces challenges in recognizing the consumer load usage

pattern to facilitate the users with reduced disturbances. For the design of customized demand strategies, the energy utility essentially requires power consumption at each and every appliance of the resident. The problem of estimating the electricity consumption of individual appliance in a building from a limited number of voltage and current measurements in the distribution system has received renewed interest from the research community in recent years [1]. With increased cost incurred in appliance specific data model, an alternative approach of unsupervised model has been thought of over years with the advent of recent developing technology. This revised approach helps to categorize individual load from the aggregate value taken at a typical load consumption point without much cost involvement. This has motivated to use the concept of Non-Intrusive Load Monitoring (NILM) in the energy disaggregation process.

Non-Intrusive Load Monitoring (NILM) or Power Disaggregation is the identification process of individual load consumption from the aggregated energy. In other words, the individual device usage can be tracked by knowing only the main data. The non-intrusive energy monitoring

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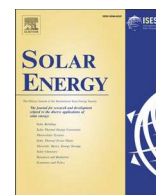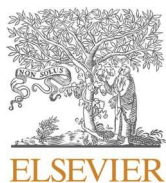
Performance analysis of n-type PERT bifacial solar PV module under diverse albedo conditions

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ABSTRACT

The additional gain in the energy yield of a bifacial solar photovoltaic (PV) module is mainly due to its ability to absorb the ground reflected irradiance (Albedo) through the rear surface of the module. Albedo is the critical characteristic that depends on the surface of the ground, the position of the sun, module clearance, module spacing, tilt angle, etc. The higher the value of albedo, the more is the bifacial gain and so the energy yield. This work investigates the performance of the ELAN series N-type passivated emitter rear totally diffused (PERT) bifacial PV module installed at latitude 9.673° N and longitude 77.964° E under diverse albedo conditions. The ground surface under the module is covered with different reflective materials and the performance parameters like albedo, bifacial gain, and the peak power output are calculated and compared. For aluminum reflective surface, the value of albedo is high and in the range of 0.50–0.57, with an average bifacial gain of 21.4%. The white reflective surface stands next with the value of albedo between 0.37 and 0.42, and an average bifacial gain of 18.9% followed by the reflective surfaces of cement, sand, and grass with an average bifacial gain of 12.8%, 7.8%, and 4.8% respectively. Depending upon the albedo and the bifacial gain, the bifacial solar PV produces the additional power gain. Overall, from the experimental results, it is observed that different reflective materials with different albedos produce different bifacial gain and peak output power depending on the operation conditions.

1. Introduction

In the global energy market, the contribution of solar photovoltaic (PV) generation is vital and ranked third-largest among all renewable electricity technology. The evolution of solar PV technology over the years results in new varieties of solar cell designs. Bifacial solar PV technology is one among them, which allows the light energy to enter the rear side of the cell, thus producing more output power per square meter area. Because of this feature, its market share is rapidly increasing over conventional monofacial solar PV technology. The performance of a bifacial solar PV system depends on ground reflectivity otherwise called Albedo, which is one of the critical site characteristics. The high value of albedo results in more rear irradiance and more output power from a bifacial solar PV system (Mekemeche and Beghdad, 2021; Deline et al., 2019). The additional fraction of energy produced by a bifacial solar PV when compared with the monofacial solar PV system is expressed as Bifacial Gain (BG). It increases with the albedo, module height, module, and row spacing (Stein et al., 2021). The improved design of bifacial solar PV cells results in better performance. Thus, lowering the Levelized Cost of Electricity (LCOE) by around 2–8% in comparison with monofacial solar PV systems (Patel et al., 2019; Lazard, 2017). Performance of c-Si bifacial solar PV is assessed in an indoor testing method with different mounting arrangements like an open rack, structure with baffles, and three modules, with white reflectors of different sizes and at a different distance from the rear side of the module. For certain arrangements, the additional rear irradiance in the bifacial solar PV increases the output power up to 20% when the white reflective surface is placed optimally. Also the rear side irradiance non-uniformity needs to be obtained carefully and systematically as this introduces uncertainty in the performance of the bifacial solar system. (Lopez-Garcia et al., 2019). Installation height or elevation is the distance of the lower module edge from the ground. When the

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RESEARCH PAPER

Enhanced Method of Mitigating Voltage Sags and Swells Using Optimized Fuzzy Controlled DVR

O. Jeba Singh[1] [ID] · D. Prince Winston[2]

Abstract

Recently, power quality becomes a major concern in Power Distribution System. To maintain power quality, the occurrence of voltage disturbances has to be detected and compensated. Disturbances such as voltage swell, voltage sag, and transients will cause severe problems to the electrical devices. In this paper, a fuzzy-based Dynamic Voltage Restorer tuned using particle swarm technique was proposed to mitigate the above disturbances. The performance of Dynamic Voltage Restorer is enhanced by the fuzzy controller to control the direct and quadrature voltage components. Optimized tuning through particle swarm optimization helps to achieve an accurate compensation under various fault conditions and nonlinear loads. This proposed scheme shows an ultimate performance in quick detection and mitigation compared to the existing methodologies. Also, the Total Harmonic Distortion caused by the power electronic components gets reduced considerably. Finally, simulations are carried out using MATLAB/SIMULINK platform and the effective results are validated.

Keywords Dynamic voltage restorer · Fuzzy logic controller · Point of common coupling · Total harmonic distortion · Particle swarm optimization

1 Introduction

Electric Power Quality (PQ) is defined as the ability of the power system to deliver quality power to the consumers within the specified limits. If any deviation occurs in the pure sinusoidal waveform it is categorized into different PQ disturbances such as Sag, Swell, Harmonics, Transients, and Flicker (Babaei et al. 2012). According to the IEEE standard 1159, Sag is defined as the decrease in RMS value of voltage or current from 0.9 to 0.1 per unit at the power frequency not exceeding a time duration of 1 min. Similarly, Swell is defined as the increase in RMS value of voltage or current from 1.1 to 1.8 per unit at the power frequency not exceeding a time duration of 1 min (see reference IEEE std 1986). Normally, in power distribution system disturbances will occur due to various faults at the load side such as short circuit fault, load shedding and load switching. Moreover, Harmonics are caused due to nonlinear loads like semiconductor devices, solid-state switching devices, microcontrollers, switched mode power supplies and inverters. Therefore, eliminating such problems is essential and it can be done in two ways (Shringi et al. 2018), either by reducing the cause for the fault or by compensating the disturbances using suitable devices. In second category of elimination custom power devices such as DSTATCOM, Dynamic Voltage Restorer (DVR) and UPQC are recently used to inject the voltage required for compensating PQ disturbances (Farooqi et al. 2019) Among those devices, DVR has a quick response feature and it became the most effective and suitable tool for compensation in distribution networks (Soomro et al. 2020). DVR is a series-connected power electronic device made up of multi-level Voltage Source

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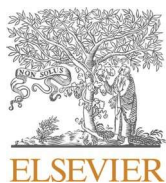
Battery based mismatch reduction technique for partial shaded solar PV system

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ARTICLE INFO

ABSTRACT

In solar photovoltaic (PV), the existence of partial shading and faults deteriorates the overall performance. Many reconfiguration techniques are used to curtail mismatch losses. The main shortcomings of the PV reconfiguration are the detection of faults and partial shading. Most of the reconfiguration techniques extract less power from PV arrays due to the above shortcomings. This paper proposes a novel PV configuration with a battery connected across the rows of each Total Cross Tied (TCT) array. This technique eradicates the necessity of reconfiguration in PV array. A 3×3 TCT PV array, which consists of 9 modules with a 10 W rating. The effectiveness of the proposed method has been tested in the MATLAB Simulink environment. The analysis is carried out in terms of output power and performance parameters. The experimental results were also taken and it is validated with Simulink. Additionally, a comparative study was conducted on the various existing methods presented in the literature. From the results, it is evidenced that the proposed configuration enhances the output power of PV by 39.46%. The study results show the significance of the proposed method. This study would be significantly useful for the researchers in mitigating the fault and partial shading effects.

1. Introduction

Renewable energy sources have gained attention due to the scarcity and environmental concern of fossil fuels. Among the available renewable energy sources, the solar PV system is found to be reliable due to the abundance, less maintenance, environmentally friendly and assistance provided by the government. The major impediments to the expansion of the PV system are high installation costs and low conversion efficiency [1].

The performance of the PV system relies on many factors such as irradiance, temperature, ageing, partial shading and degradation of modules. Among these, partial shading was the most significant factor. Partial shading may occur because of shading of trees, adjacent building, dirt and dust, etc. In this situation, the PV system is categorized to operate under homogenous and non-homogenous conditions. Under homogenous conditions, all the modules in the PV array will receive uniform irradiation and temperature, thereby delivering a global maximum power peak. However, in the non-homogenous condition, the PV modules connected in the array receive non-uniform irradiation and temperature. The shaded module acts as a load and dissipates the power in the form of heat. One of the approach, to overcome the effects of partial shading is by connecting a bypass diode across the module.

Under the normal operating conditions, the bypass diode is reverse biased and acts as an open circuit. During the partial shading condition (PSC), the reverse voltage across the PV cell forward biased the bypass diode and provided an alternate path for the current flow for the shaded modules. The heat generated should be uniformly distributed throughout the PV cell, but this may not occur all the time. The increase in cell temperature leads to hotspot and permanent damage to the PV cell [2,3].

The PV modules with bypass diodes are used to prevent the hot spots under the PSC. However, the introduction of a bypass diode results in multiple power peaks in the output characteristics. This may leads to mismatch losses (ML) and misleading power loss [4–6]. Therefore, an

ORIGINAL PAPER

Fault identification scheme for solar photovoltaic array in bridge and honeycomb configuration

Sakthivel Ganesan[1] · Prince Winston David[1] · Praveen Kumar Balachandran[2] · Tomonobu Senjyu[3]

Abstract

Large solar power plants are installed in many countries, and they are connected to an electrical grid thereby providing an alternative to conventional energy sources. Photovoltaic cells are using solar energy directly and convert it into electrical power. To ensure there liable and safe operation of PV arrays, it is very essential to diagnose faults in PV arrays. Traditional fault detection devices are used for detecting line-to-line fault and open-circuit faults, if the magnitude of fault current defined as per international standards exceeds the threshold value. Due to several aspects like low irradiance condition, minimal fault mismatch, and active maximum power point trackers which minimizes the magnitude of fault current thereby resulting in fault identification becoming much more difficult. In case a fault in a PV array is not identified and the fault persists for a very long duration, it results in reliability issues and also it may lead to severe fire hazards. Hence, it is essential to identify the fault in a timely manner, and also localization is very much essential for sustainable power generation. This paper proposes new fault identification scheme for solar PV arrays connected in bridge and honeycomb configuration, and this method is capable to detect line-to-line fault and open-circuit faults with a minimum number of sensor requirement and also irrespective of the detection challenges. For real time, validation testing is carried out in a PV array, and the power gain due to the identification of line-to-line fault and line-to-ground fault is also investigated.

Keywords Photovoltaic array · Line-to-line faults · Open-circuit faults

1 Introduction

Due to severe concern for environmental pollution and reduced availability of fossil fuel for electrical power generation, among renewable energy sources, the solar energy sector is growing worldwide in the past few decades, and this huge growth is because of free availability and also unlimited solar power. The main focus shifts to solar energy because of the energy conversion process, and there is no necessity for moving parts. In 2020, the global PV installed capacity is 773.2 gigawatts; this is due to the reduction in the cost of PV modules, aggressive feed-in tariff policy, and also government subsidies. However, decreased subsidies make poorly skilled designers involved during PV installation results in unaccounted panel faults. Due to this fault, many customers are yielding very low energy. A research work reveals that the energy loss would be around 18.9% of the total capacity of installed PV in the United Kingdom [1]. The other recent fault detection techniques using image processing methods like thermal image processing [2], SVM tool box [3], CNN [4] and mismatch loss mitigation algorithm [5] were discussed, and these methods are very costly. Hence, it is mandatory to develop fault detection and localization method for reducing energy loss.

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Fabrication of Natural Dye Extractor

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Abstract

Now a day major problem is water pollution. The reason for water pollution is discharge of chemical dye solution into the river. Many dye industries have been developed to color fabric into different color and each color requires different chemicals. Every dye system has different characteristics in terms of versatility, cost, tension of fabric, use of carriers, weight limitations, etc. Commercially natural dye is extracted from leaves, flowers, woods and roots. The major difficulties are extraction of color from that source. These drawbacks of the existing dyeing process have been addressed time and again with development in newer technologies. The main objective of this project is to develop a eco-friendly dyeing machine which consumes less power and water source. The dye source used is Henna. This proposed machine is in such a way that it will extract dye.

INTRODUCTION:

Natural dye is an eco-friendly and it is obtained from natural source. The process of coloring fibers, yarns or fabrics by using a liquid containing coloring matter for imparting a particular hue to a substance. There are many plant materials that can be used for dyeing yarns and materials: roots, bark, leaves, berries, seeds, twigs, branches, tubers, and nut hulls, each capable of producing a range of colors with various mordants and yarns. In addition, when properly applied, natural dyes are fast, resisting fading due to exposure to sunlight. There are a wide variety of factors that can affect the color that results from your natural dyeing.

The dyeing fastness was so poor and the dyed fabric was harmful for the health of human. People try to invent the better way of dyeing and they invented the semi continuous dyeing machine. This dyeing machine which helps in continuous and batch processes. Natural and synthetic dye was made with different color used to dye on fabric. Synthetic dye is more effective but the effluent released causes much harm to the environment. Whereas in natural dye has less tendency to be

Experimental Investigations of Portable Ball Throwing Machine

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ABSTRACT

A portable ball throwing machine is a device that is designed to automatically cricket balls, such as baseballs or tennis balls, for training and practice purposes. The machine is designed to be lightweight and easy to transport, making it ideal for use in variety of settings, including sports fields, parks, and backyards.The machine consists of a motorized wheel or arm that launches the ball at a predetermined speed and angle. The user can adjust the settings on the machine to control the speed , allowing for a range of different training scenarios.Portable ball throwing machines are often used by athletes and coaches to improve their batting or fielding skills. They can also be used for physical therapy and rehabilitation purposes, as well as for fun and entertainment in recreational settings.Overall, portable ball throwingmachines are a useful tool for anyone looking to improve their ball-handling skills or simply have fun playing a game of catch.

Keywords - DC-Direct Current, AC-Alternate   Current,   RPM-Rotations perMinutes,

INTRODUCTION

A portable throwing ball machine is a device that is designed to help cricket practice their throwing or hitting skills. It is typically used in sports such as baseball, cricket, and tennis, among others. The machine consists of a base, a throwing arm, and a hopper that holds the balls. The machine can be adjusted to throw balls at different speeds and angles, making it an ideal tool for athletes to improve their accuracy and timing.One of the main advantages of a portable throwing ball machine is its portability. It can be easily transported to different locations, such as a field or a court, allowing athletes to practice their skills wherever they want. Additionally, the machine can be used by athletes of all skill levels, from beginners to professionals.Overall, a portable throwing ball machine is a valuable tool for athletes who want to improve their batting shots or hitting skills. Its versatility, portability, and adjustability make it a popular choice for sports enthusiasts and coaches alike.

MECHANICAL WORK

Portable ball throwing machine includes a pair of adjacent ball ejecting wheels, each provided with a concave surface formed in body of an elastic material. These wheels are mounted on base for axial rotation in a common plane, and the gap between the wheels should be slightly less than the diameter of a ball to be thrown and at last speed of each wheel can be adjustable independently. This machine transfers the kinetic energy to the ball by frictional gripping of the ball between two rotating wheels. The base is provided by a tilting assembly, which is mounted on a bracket so that the required angular adjustment of the rotational plane of the wheel about axis parallel to direction of delivery of ball and its perpendicular axis is possible. Controls are provided for controlling the speed of the wheel. These adjustments of relative speeds and rotation of plane of the wheels gives wide variations in the speed and swing of the ball.

Two Phase To Three Phase Converter for Agriculture Pumping

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ABSTRACT:

A two-phase to three-phase converter using capacitors is a type of electrical circuit that converts a two-phase electrical supply into a three-phase electrical supply. A two-phase to three-phase converter is a useful circuit for converting a two-phase electrical supply to a three-phase supply. This type of converter is commonly used in applications where a three-phase motor is required. The basic idea behind this type of converter is to use a bank of capacitors to create the missing phase of the three-phase supply.

The circuit works by connecting the two-phase supply to a capacitor bank, which is made up of capacitors of equal capacitance. The capacitors are arranged in a delta configuration, with each capacitor connected between two of the three output terminals. This arrangement creates a voltage across each capacitor that is equal to the voltage across the input phases. As the two-phase supply alternates, the capacitors charge and discharge in sequence, effectively creating a third phase that is 120 degrees out of phase with the original two phases. This new phase is then combined with the original two phases to create a balanced three-phase supply. The main advantage of this type of converter is that it is relatively simple and inexpensive compared to other types of three-phase converters.

INTRODUCTION:

A two-phase to three-phase converter is a device that is used to convert a two-phase power supply into a three-phase power supply. This is typically done in situations where a three-phase power supply is required. One common method for converting two-phase power to three-phase power is by using a capacitor. This method is also known as the "static phase converter" method. Select a capacitor that is appropriate for your power needs. The size of the capacitor will depend on the power requirements of your equipment.

Consult an expert if you're ensure. Connect the capacitor to the two-phase power supply. The capacitor should be connected between the two power lines. Start the equipment that needs the three-phase power supply. The capacitor will create a phase shift in the second line of the two-phase supply. This phase shift will create a third "virtual" phase, which can be used to power the equipment. The equipment should now be running on a three-phase power supply.

WORKING PRINCIPLE:

A 5 hp motor, a total capacitance value of around 200 μF would be suitable. The specific values of capacitance required for each capacitor would depend on the voltage and frequency of the two-phase power supply. The two 25 MFD capacitors, the one 10 MFD capacitor, and the one 120 MFD capacitor. Capacitor bank is then connected between one of the phases of the two-phase power supply and the common neutral wire. The capacitor bank should be

THE CROSS-CULTURAL AND SOCIO-POLITICAL REALITIES OF INDIA IN MANOHAR MALGONKAR'S NOVELS

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Abstract: Cross-cultural conflicts and political problems were nearly new forms in Indian writing in English at post-independent India. But the writers of this era handled the theme in a spectacular manner and they presented their writings with emotions, communal harmony, common cultural heritage, peace and prosperity. They also express grief at the increasing threat to harmony. Many Western writers found it near-impossible to write fiction on the great disasters made to a certain race or society. The absolute horror of the event disturbed them so much that they found it difficult to recreate the event in the mode of fiction. It remained a challenging task for a creative writer to express the real trouble of the Partition-situation. Manohar Malgonkar was a famous Indian writer who narrates the socio-political issues, cross cultural conflicts, non-violence and the sufferings of the society.

Keywords: *(cultural heritage, partition, political perspectives, socio-political)*

Cross-cultural conflicts and political problems were nearly new forms in Indian writing in English at post-independent India. But the writers of this era handled the theme in a spectacular manner and they presented their writings with emotions, communal harmony, common cultural heritage, peace, and prosperity. They also express grief at the increasing threat to harmony. Many Western writers found it near-impossible to write fiction on the great disasters made to a certain race or society. The absolute horror of the event disturbed them so much that they found it difficult to recreate the event in the mode of fiction. It remained a challenging task for a creative writer to express the real trouble of the Partition situation as Srinivasa Iyengar points out the near impossibility to describe the scale of the partition riots: ". . . for the artistic projection of the things that happened in 1947, not even the images of Dante's inferno can possibly prove adequate" (Iyengar, 324-25). Manohar Malgonkar was a famous Indian writer who narrates the socio-political issues, cross-cultural conflicts, non-violence, and the sufferings of society.

Manohar Malgonkar is one of the well-known Indo-Anglian novelists of the post-Independence period. He had written six novels namely, Distant Drum (1960), Combat of Shadows (1962), The Princes (1963), A Bend in the Ganges (1964), The Devil's Wind (1972) and Open Season. He has written three volumes of short stories, A Toast in Warm Wine (1974), Bombay Beware (1975) and Rumble - Tumble (1977). His novels such as The Princes and A Bend in the Ganges, achieved magnificent success.

Multimodal Paddy Leaf Diseases Detection Using Feature Extraction And Machine Learning Techniques

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Abstract. Agriculture is a major determinant of a country's economic development, and it is the primary source of income for most Indian farmers. One of the most often cultivated crops is paddy. However, paddy cultivation is affected by changing environmental conditions and subjected to suffer diverse diseases. Majority of these diseases initially damages the plant's leaves, but eventually it progresses throughout the paddy crop impacting the quality and quantity of yield. By accurate and timely diagnosis of those diseases and pests can assist farmers in opting for suitable plant treatment thereby reducing economic loss that leads to improved yield. To do so, the feature extraction methods like GLCM, GLDS, GLRLM, and LBP are used in this study to extract features from the Kaggle rice disease dataset. SVM, Decision Tree, KNN, and Naive Bayes classifiers are employed to classify the features obtained by those approaches. To detect paddy leaf diseases, the most successful feature extraction technique and classification algorithm has been demonstrated.

Keywords: Paddy Leaf Disease · Feature Extraction · Machine Learning · GLCM · GLDS.

1 Introduction

Agriculture is critical to any country's economic development. One such crop that is of crucial importance in agriculture is paddy. Since rice is the primary source of food for most Asian people (90% of the world's rice is produced and consumed in Asia [15]), it is essential to ensure the disease-free and high productivity rate of paddy. Besides, India's population is expanding at a rate of 1.0 percent each year [16] and is a warning sign to conserve quality of paddy cultivation to keep up with the country's growing population.

Meanwhile, farmers lose an average of 37% of their rice yield due to pests and crop illnesses [14]. If any element affects the quality and rice productivity, it has a direct impact on a larger cultivation statistic across the world. It is imperative to note that rice productivity is slowed for a variety of causes. One such major

Water Quality Prediction For Agriculture

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Abstract : Water is one of the most essential element for the existence of life. The safety and accessibility of drinking-water are major concerns throughout the globe. Health risks may arise from consumption of water contaminated with infectious agents, toxic chemicals etc. In this paper a system is proposed to check the water quality and warn the user before water gets contaminated .There are different parameters that can contaminate the water. These parameters are taken into account and used for predicting when to clean the water. The system uses technologies such as IoT and Machine Learning. It consist of the physical and chemical sensor to measure pH, turbidity ,colour, DO, conductivity etc. to check the parameters .The data obtained from the sensors are recorded in the database and further sent for analysis. The neural network algorithm is used for predicting the result. It is used to obtain non-linear relationship for predicted output. The system sends the alert message to user when any of the parameters are lower than the standard values. This helps the user to know beforehand about the contamination of water in their residential tanks. This technique can not only be limited up to residential tanks but can also be used in water treatment plants and industries.

IndexTerms - Parameter, Accuracy, Heatmap Generation, Time series analysis,Prediction..

I INTRODUCTION

A subfield of artificial intelligence (AI) and computer science called machine learning focuses on using data and algorithms to simulate how humans learn, gradually increasing the accuracy of the system.IBM has a long history with artificial intelligence. One of its own, Arthur Samuel, is credited with creating the term "machine learning" with his research on the game of checkers (PDF, 481 KB) (link lives outside IBM). In 1962, Robert Nealey, a self-described checkers master, competed against an IBM 7094 computer, but he was defeated. This achievement nearly looks insignificant in comparison to what is currently possible, but it is regarded as a significant turning point in the development of artificial intelligence. The subsequent two decades' worth of technological advancements will result in Certain cutting-edge technologies that we already know and appreciate, like Netflix's recommendation engine or self-driving cars, will be made possible by increased storage and processing capacity.The rapidly expanding discipline of data science includes machine learning as a key element. Algorithms are trained to generate classifications or predictions using statistical techniques, revealing important insights in data mining operations. The decisions made as a result of these insights influence key growth indicators in applications and enterprises, ideally. Data scientists will be more in demand as big data continues to develop and grow, necessitating their assistance in determining the most pertinent business questions and ultimately the data to answer them.

II LITERATURE SURVEY

[1] Forecast of Water Quality This work presents the modelling and forecasting of water quality using artificial intelligence algorithms developed . The Water Quality Index (WQI) and Water Quality Classification (WQC) algorithms, as used in today's advanced technology, have been used in this research. Long Short-Term Memory (LSTM) and Nonlinear Autoregressive Neural Network (NARNET) are two examples of deep learning methods. In order to categorise the WQI, machine learning methods like SVM, KNN, and Nave Bayes are also used.

[2]Jitha P. Nair and M. S. Vijaya's Prediction Models for River Water Quality Using Machine Learning and Big Data Approaches. This Paper discusses how water resources are becoming more contaminated. Industrial waste, human waste, vehicle waste, agricultural runoff from farmlands carrying chemical elements, undesired nutrients, and other pollutants from point and non-point sources flow to water bodies, which affects the quality of the water resources, etc. The amount and quality of water are affected by the rise in pollution, which puts human health and other living things on the earth at serious risk. In light of this, it is now important

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Development and Characterization of Sustainable Bioplastic Films Using Cellulose Extracted from *Prosopis juliflora*

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ABSTRACT

To diminish the environmental impacts instigated by plastics, investigators recommended bioplastics. In the current work, an attempt is made to develop sustainable bioplastics from waste plants. Cellulose was extracted from the wood of *Prosopis juliflora*. The *Prosopis juliflora* wood was cut and ground into powder. The powder was washed with water and subjected to several chemical treatments to extract the cellulose. The bioplastic film samples were produced using it. Six different samples were prepared by varying the composition of cellulose, gelatin, citric acid, and glycerol. Several tests were carried out on samples developed as per ASTM standards, and the results were compared with the existing bioplastics. The test results indicated that sample 1 has a maximum tensile strength of 7.73 MPa. The average bursting strength of the bioplastic film is 12.44 kg/cm^2, which is better than the other bioplastics reported in the literature. The average biodegradability of developed bioplastic films is approximately 59.43%. The results revealed that the *Prosopis juliflora* cellulose-based bioplastics would be a better substitute for conventional plastics.
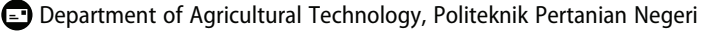
摘要

为了减少塑料对环境的影响，研究人员推荐使用生物塑料. 在目前的工作中，试图从废物工厂中开发可持续的生物塑料. 从胡罗卜的木材中提取纤维素. 普罗索匹斯的juliflora木材被切割并研磨成粉末. 用水洗涤该粉末并进行若干化学处理以提取纤维素. 使用它生产生物塑料薄膜样品. 通过改变纤维素、明胶、柠檬酸和甘油的组成制备了六种不同的样品. 对根据ASTM标准开发的样品进行了几项测试，并将结果与现有的生物塑料进行了比较. 试验结果表明，样品1的最大抗拉强度为7.73MPa. 生物塑料薄膜的平均爆裂强度为12.44 kg/cm2，比文献中报道的其他生物塑料要好. 已开发的生物塑料薄膜的平均生物降性约为59.43%. 研究结果表明，基于Prosopis juliflora纤维素的生物塑料将是传统塑料的更好替代品

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Article

Investigation of Fiber-Based Bag Filter Coated with Metal Oxides for Dust Adsorption

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Abstract: The production of cement increases every year, which leads to the emission of dust/gas/particulate matter. The emission of unfiltered dust would create a significant environmental impact. Hence, it is the responsibility of industries to control the emission of dust. Air filters and electrostatic precipitators (ESP) play a significant role in controlling pollutants. Synthetic filter media which are dangerous to our environment are widely used in most industries. The disposal of synthetic filters is an arduous task as the biodegradability of synthetic materials is poor. Hence, it is essential to develop an eco-friendly air filter material. In this paper, a new type of bag filter was designed by using natural sisal fiber as filtering media. The biodegradability of sisal fiber is better than the synthetic polyester media and also sisal fiber is less expensive. The natural fibers were coated with zinc oxide and iron oxide nanoparticles to improve the dust adsorption rate. Various tests were conducted as per standards to validate the performance of the filler media. The results were impressive. Hence, the proposed sisal fiber-based filter media can be used in cement industries for dust adsorption to minimize the environmental impact.

Keywords: dust; eco-friendly; bag filter; natural fibers; metal oxide particles

1. Introduction

Numerous diseases threaten human beings today. Climate change and global warming are some of the problems faced by humans due to pollution. Soil, water, and air pollution are the main causes of these problems. Among them, air pollution is more severe as it directly affects the respiratory systems of living creatures. Air pollution is caused by several factors. Dust is one of the major sources of air pollution which affects human health as well as the environment due to its small particle size. The dust is produced by a variety of industries. One of the largest sources producing dust is the cement industry which emits particulate matter and gaseous pollutants such as NOX, SOX, carbon oxides, and Volatile Organic Compounds (VOCs) [1]. The various sources of pollutants and the methods to reduce pollution can also be seen in [1]. Bag filter plays a vital role in the cement industry in filtering dust with minute particles. Xiao et al. [2] described the manufacturing procedure, structure of the products, their performance, merits and demerits, and extensive applications of various non-woven filter materials made of glass fiber. They described the significant role of air filters in industries. They also suggested the importance of the development of eco-friendly filter materials. However, the cost of glass fiber is high. Aravind Kumar et al. [3] developed bag filters using coconut and jute fibers. They analyzed the physical, mechanical, and chemical characteristics of the fibers. They coated the fibers with zinc oxide nanoparticles to improve the adsorbent ability of the fibers. The air permeability test was conducted by them to validate the performance of the natural fiber-based filter medium. They concluded that the coated nanofibers have a better adsorbent ability. Becheri et al. [4] reported the blend and characterization of

A characterization of group vertex magic trees of diameter up to 5

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Experimental studies on automated DC pulsed MIG welding of Monel 400 sheets

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ABSTRACT

Hot-rolled Monel 400 sheets of 2 mm thickness were effectively welded by the automated DC-pulsed gas metal arc welding (DC-pulsed GMAW) process using ERNiCu-7 (NA60) filler. An L9 array has been used in this work to obtain optimal robotic welding parameters to achieve better weld quality. The weldments was subjected to microstructural examinations using optical microscopy. The chemical compounds and elements of the weldments were determined using X-ray diffraction and energy-dispersive analyses. The microhardness and tensile properties of the weldments were evaluated. The corrosion behavior of the base metal and weldments was estimated in service environments by exposing them to a 3.5% NaCl solution using a potentiodynamic polarization method. The weld zone has the highest microhardness value of 154 HV. Monel 400 weldments have lower joint strength and elongation than the base metal. In addition, weldments have a higher corrosion rate (201.1 mm/yr) than base metal (55.64 mm/yr).

Introduction

Nickel-based superalloys are mainly used to make parts for the marine and aerospace industries due to their high strength and excellent corrosion resistance in acidic environments.[1] Monel Alloy is one of the nickel-based superalloys utilized in the various industrial sectors for its excellent strength and corrosion resistance.[2] Monel 400 is a nickel – copper alloy with excellent ductility, fatigue strength, and corrosion resistance at high temperatures. It can withstand high-temperature steam, salt water, and caustic solutions.[3] Metal inert gas welding is a seamless technic for assembling and renewing both surface and interior of any structure.[4] ASTM A 106 Grade B pipes were welded using an automated MIG method to assess metallurgical and mechanical weld quality by varying the control factors such as input voltage, feed rate of filler wire, and CO_2 gas flow rate.[5] The effects of the DP-GMAW and P-GMAW procedures on the mechanical and metallurgical characteristics of a thin sheet of AA6061 aluminum alloy were evaluated.[6] The selection of proper welding parameters is essential for achieving higher mechanical strength while reducing weld defects.[7,8] It was necessary to improve welding parameters such as weld current, wire feed rate, and welding speed to achieve defect-free weldments with complete depth penetration. The mechanical properties and pitting corrosion behavior of gas tungsten arc (GTA) welded Monel 400 weldments were studied.[9] AISI 304 and Monel 400 dissimilar joints are commonly used in marine and offshore conditions, as well as in oil and gasification plants.[10] Monel 400 and AISI 316 dissimilar weldments established by two fillers were studied and compared.[11] Cherish Mani et al. (2019) studied the corrosion resistance of a Monel 400 tube welded to an SS 316 tube using the GTAW process. Weld region

on both specimens exhibited better corrosion resistance when compared to other zones. The results showed that the heat-affected zone of Monel 400 and SS316 had lower corrosion rate because of higher amounts of chromium than SS 316.[12] The mechanical properties of the friction stir welded Monel 400 and Inconel 600 dissimilar weldments were investigated.[13] The mechanisms influencing the microstructure and mechanical properties of Monel during friction stir welding (FSW) at various heat inputs were investigated.[14] Welding consumables for dissimilar metal combinations such as Monel 400 and Inconel 600 were explored.[15] Monel 400/Nb bilayer used a laser to join 304 SS and TC4 Ti alloy. It was possible to make a joint that could hold up to 258 MPa of tension.[16] The tensile properties of gas tungsten arc welded 316 L stainless steel/Monel 400 joints were investigated. The break happened when the Monel 400-Nb interface and the joint showed the brittle mode. Also, the numerical solution and the experimental data were compared.[17] Different filler wires, such as SS 316 L, Monel 400, and ENiCrFe-5, have been employed under various welding conditions in Gas Tungsten Arc Welding for welding SS 316 L and Monel 400 alloys.[18] Bi-metallic welds of AISI 304 and Monel 400 have been made using welding procedures such as GTAW and GMAW welding, both of which have proven to be effective.[19] A new strategy established by merging fuzzy-regression with Enhanced Teaching Learning-Based Optimization (ETLBO) algorithm logic has been utilized to acquire optimal robotic welding parameter settings for achieving the best weld quality measurements.[20]

Despite these studies, a greater understanding of the mechanical properties of MIG-welded Monel 400 joints is required. The pulsed-metal inert gas (pulsed-MIG) welding procedure was used

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ORIGINAL ARTICLE

Utilization of bio-waste material pomegranate peel powder along with silver nitrate and polyvinyl alcohol to form a hybrid biofilm

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Abstract

This work aims to convert the bio-waste material into a fruitful product. This prepared product can be a solution for environmentally hazardous materials like polymer bags and plastic food wrappers. The prepared material is composed of bio-waste pomegranate peel powder and environmentally friendly polyvinyl alcohol. To extend its functionality in food wrappers, the silver nitrate solution is incorporated. The prepared samples were undergone various performance studies. The prepared films show high thermal with standing capacity and tensile properties and especially show better results in biodegradability as well as antibacterial activity. Among the fabricated films, the 5 mM $AgNO_3$-fabricated film shows that the thermal stability up to 331 °C also possesses higher tensile strength of 25.7 MPa. These results make the possibilities of the fabricated PP/PVA/5 mM AgNPs film as an alternative for conventionally used plastic-based food wrappers.

1 Introduction

Polymers have been used for a long time of period as a packaging material due to their flexibility, lightness, transparency, and softness. Moreover, there are serious ecological issues because of their non-biodegradability which causes hazards to human health [1]. Hence, the world is moving to an eco-friendly polymer material which has biodegradable properties for packaging applications. Moreover, the polymer material possesses compostability property which allows it to dispose of in the soil after usage [2]. Therefore, in this study, we have planned to prepare an eco-friendly bio-based polymer material with biodegradable and compostability properties for packaging applications.

The bio-based polymer materials are used as a matrix for the preparation of biofilm as food packaging. As discussed above, the selection of polymer material is significant which means that it possesses the property such as biodegradability or compostability. Furthermore, bio-based polymers should have excellent mechanical and physical absorption properties. Naturally, these two properties are present in polyvinyl alcohol (PVA) polymer [3, 4]. Moreover, the PVA material is a synthetic, water-soluble material made by polymerizing vinyl acetate with excellent film formation capacity [5]. Hence, PVA is used as matrix material in this study for the preparation of food packaging film. Furthermore, to enhance the biodegradability, composability property, and mechanical properties, the matrix material is combined with a variety of biodegradable filler materials, including inorganic fillers (clay, calcium carbonate, etc.), natural fillers (plants, waste from wood, and fruits), metallic (palladium, silver, gold, nickel and cobalt) fillers, and nonmetallic (graphene, CNT) fillers [6]. PVA's characteristics and utilizations have been improved by the addition of various biodegradable filler ingredients [7–9].

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ORIGINAL ARTICLE

Evaluation of physiochemical, mechanical, thermal, UV barrier, and biodegradation properties of PVA/corn (*Zea mays*) cob powder biofilms

B. Balavairavan[1] · S. S. Saravanakumar[1] · P. Senthamaraikannan[1] · S. Indran[2] · Suchart Siengchin[2]

Abstract

The yearly production of agro-solid waste in the form of maize (*Zea mays*) cobs is almost ten million tons, and its use as dissolution medium in animal health products, fluid retainer in gardening, soil conditioner, and strengthening agent in bio-materials is remarkable. The focus of this article is to explore the possibility of using maize (*Zea mays*) cob powder (ZMCP) as reinforcement filler in a PVA matrix. The composite films were made using the solution casting technique with a ZMCP concentration of 5–25 wt% in a homogeneous PVA polymer solution. The composite films were uniformly pale yellow in hue. The PVA/ZMCP films were characterized by FTIR, XRD, thermogravimetric analysis (TGA), morphology, transmissibility, tensile test, % of water absorption, WVP, and soil burial tests. The incorporation of *Zea mays* cob powder enhanced the thermal stability, transmissibility, and biodegradation properties of the film. The PVA/ZMCP biofilm samples were thermally stable up to 322.16 °C. The surface morphology of films indicated that the excellent compatibility between base materials up to 20wt% of ZMCP loading. PVA/(20wt%) ZMCP biofilm exhibited maximum tensile properties. Because of the ZMCP concentration throughout the PVA matrix, the % of water uptake, % of film solubility, and WVP all rose gradually. PVA/ZMCP biofilms lost up to 56.8% of their weight in the soil after 30 days. In essence, the PVA/ZMCP films possessed all desirable properties to be considered as novel and intelligent materials for packaging and enfolding applications.

Keywords *Zea mays* cob powder · Agro-residue · PVA · Biodegradation · WVP

1 Introduction

Biopolymers were widely explored in the previous epoch to produce sustainable, compostable, and adaptable products for use in healthcare, pharmaceutical, cosmetology, and the food processing industry [1, 2]. Investigators are now paying greater consciousness to the recyclability of packaging materials as well as the stability of packaging. As a result, numerous attempts are being made to replace conventional plastic products with compostable alternatives [3, 4]. Because of its molding adaptability, cheap cost, excellent formability, and resilience to various ecological and structural conditions, plastic materials are extensively exploited for flexible packaging [4]. Nonetheless, plastic packing materials require long time to break down; therefore, they will be nuisance to the surroundings. As a result, several manufacturing industries are focusing their heed on the development of ecologically friendly commodities [5]. Biopolymers originating from nature, such as protein, lipids, polysaccharides, and starch, are extensively employed as the backbone for biodegradable packaging [6–8].

By bearing in mind these circumstances, many researchers utilize biofilms in packaging applications to reduce plastic futile as well as limit the discharge of CO_2 in the atmosphere [7, 9]. In the last decade, completely biodegradable biofilms were instigated. The bio-based green films were fabricated by solution casting method by using wheat protein, soy protein, and starches [10, 11]. The naturally derived biofilms possessed less mechanical properties and water barrier properties. The

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Springer

ORIGINAL ARTICLE

Characterization of tamarind fruit shell power-reinforced virgin and recycled polypropylene-based 3D-printed composites

N. R. Madhan[1] · **S. Senthil[1]**

Abstract

Polypropylene is widely used in the automobile, paint, and consumer product industries and is not biodegradable. Recycling polypropylene is essential to maintaining sustainability. When the polypropylene as a 3D filament is used to print a component, wrapping issue is created. Therefore, fewer articles have been published. In this study, virgin and recycled polypropylene was reinforced with tamarind fruit shell power (TFSP) as a filler to make the 3D composite filament and solution for wrapping issue was sought. The crystallite size of TFSP was 39.7 nm, and its thermal constancy was 230 °C. It also had a great crystallinity index of 43.6%. The exterior morphology of TFSPs was studied using an atomic force microscope and a scanning electron microscope. The results of flexural and tensile tests conducted on composites made of virgin and recycled polypropylene reinforced with TFSP showed that 3 wt% reinforcement is the optimal mix to produce better characteristics. An impact testing, it was found that 1.5 wt% reinforcement produces better results. All of the aforementioned findings unequivocally demonstrated that recycled polypropylene, with a tolerance limit of 15%, can be used in place of virgin polypropylene.

Keywords 3D printing · Atomic force microcopy (AFM) · Mechanical testing · NMR · Poly(propylene) (PP)

1 Introduction

Recent developments in the fused deposition modeling (FDM) technique have increased the application of 3D printing in various sectors such as manufacturing, aerospace, biomedical, and civil engineering [1]. This FDM technology is used to make specialized parts and finished goods that enable waste reduction, simplified assembly, and mass customization. Despite concerns about the environment and sustainability, the consumption of plastics for consumer goods and packaging is nevertheless increasing. Although plastic consumption is increasing year over year, the recycling rate of the plastics is only 5% [2]. The effective recycling of waste polymers remains a challenging task. Generally, after usage, plastics are burned or buried underground, which leads to the development of dust, fumes, and harmful gases in the air, contaminating the subsurface water and other resources. Recycling of polymer is one of the best

ways to handle waste polymers [3]. Addition of filler materials with polymers is another way of reducing the usage of polymers. Various biofillers such as *Pennisetum glaucum* stem powder, Manila tamarind powder, *Dracaena reflexa* power, Napier grass power, *Parthenium hysterophorus* [4], and *Vachellia farnesiana* [5] are used as reinforcement in polymer composites [6]. Tamarind fruit shell is one of the highly available agricultural wastes. In this investigation, 3D printing filaments were developed by using tamarind fruit shell powders (TFSPs) as filler materials. Before developing the filaments, basic properties of the TFSPs were investigated. Further, TFSP-reinforced virgin polypropylene (VPP) as well as recycled polypropylene (RPP) 3D printing filaments were fabricated using a single-screw extruder [7]. Mechanical properties of the developed filaments were also investigated. The process flow diagram of this investigation is shown in Fig. 1.

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Delamination study on glass/carbon hybrid composite laminates for structural applications

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A R T I C L E I N F O

A B S T R A C T

Fiber reinforced polymer (FRP) composite laminates are widely used in engineering applications covering from aerospace to household appliances due to their high strength-to-weight ratio. In all these applications, the use of mechanical fasteners in assembling process necessitates the drilling of composite panels. Drilling the composite panels, on the other hand, poses a serious threat to the quality of the holes and thereby joint strength. The goal of this research is to improve the quality of holes drilled in glass/carbon hybrid composite laminates, which are widely used in engineering. The hand layup method was used to fabricate all of the preferred laminates. A vertical machining centre was used to drill holes in composite laminates (AMS MCV-350). The L9 orthogonal array was employed to obtain the best results for three preferred drilling process control parameters: drill bit diameter, spindle speed and feed rate. For the delamination analysis of glass/carbon hybrid composite laminates, the equivalent delamination factor (F_{ed}) is used. The equivalent delamination factor of each drilled hole was measured using the digital image analysis method. Based on the experimentally determined values of the equivalent delamination factor, an effective layering arrangement was also proposed in order to achieve a quality hole with the least amount of delamination in glass/carbon hybrid composite laminates. An analysis of variance (ANOVA) was also performed on the experimental results to find the best process parameters for drilling the glass/carbon hybrid laminates with minimum delamination. The ANOVA results revealed that drill bit diameter has a greater impact on delamination than spindle speed and feed rate when drilling glass/carbon hybrid composite laminates.
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1. Introduction

FRP composite materials are employed in a wide range of engineering applications ranging from aerospace systems to consumer products [1]. FRP structures are developed as tailor-made materials in many applications to replace metal components used in corrosive environments. Because of research and innovation, many new composite materials are being developed in recent years for using different fields [2]. Glass fiber and carbon fiber composite materials (GFRP/CFRP) are the most recent examples of such materials, with the polymer matrix embedded with fibers or particles [3]. Structural fastening of FRP laminates requires precise and defect-free drilling to ensure precision and strong joint strength

[4]. Delamination is the most common problem encountered when drilling FRP laminates. Many studies have been conducted to determine the influence of machining parameters such as drill diameter, spindle speed, and feed rate on delamination during the drilling of FRP composites [5–7]. It is found that drilling thrust force to be the main reason for delamination [8]. Several methods for reducing delamination in composites have been developed over time, including: (i) drilling with a pilot hole (ii) active backup force drilling (iii) ultrasonic vibration-assisted drilling (iv) high-speed drilling (v) drilling with a back-up plate [9–12].

Researchers used a variety of methods to measure the level of delamination on the laminate [9,13,14] and proposed many terms to assess delamination around the hole [10,15,16]. Many researchers have used digital image analysis to determine the delamination damage of drilled holes [13,17,18]. Tom Sunny et al discovered that the area of delamination damage (F_{ed}) is more significant than the

Original Article

Effect of strain rate on fractography texture descriptor of AA6063/(Si$_3$N$_4$)$_x$/(Cu(NO$_3$)$_2$)$_y$ (x=12%, y = 2−6%)composite after multiple ECAP passes: second order statistical texture analysis conjunction with regression analysis

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ARTICLE INFO

ABSTRACT

The tensile strength of the ECAP processed composite of AA6063/(Si3N4)x/(Cu(NO3)2)y (x=12%, y=2-6%) at various strain rates from 0.0001 to 1s-1 with an increment of 10 was examined in relation to the seven-fracture image texture descriptor through void features such as void size and distribution. In order to measure the matrices of voids on the fracture surface created through the coalescence of void results to enhance the material hardening as strain rate increases, the second order statistical texture analysis has been used. With respect to the rising strain rate, it was observed that the composite fracture image feature parameter correlation, homogeneity improved by 6 %, and 20.74% for AA6063/12%Si3N4/6% Cu(NO3)2 after I passes as compared to AA6063/12% Si3N4 after III pass. The contrast was reduced by around 58.643% when reinforcement went from a single reinforcement of 12% Si3N4 with I Pass to a composite of two reinforcements (Si3N4, Cu(NO3)2) that had 6% Cu(NO3)2 with I Pass. After three passes on AA6063/12%Si3N4/2%Cu(NO3)2, the maximum entropy was seen due to the material's increased plastic deformation, which led to an uneven particle distribution. As strain rate and copper nitrate percentage grew from 0 to 6

ORIGINAL ARTICLE

Evaluation of characteristic features of untreated and alkali-treated cellulosic plant fibers from *Mucuna atropurpurea* for polymer composite reinforcement

P. Senthamaraikannan[1] · S. S. Saravanakumar[1]

Abstract

In this study, a newly identified *Mucuna atropurpurea* cellulosic fiber was alkalized, and the alkalization duration was optimized by chemical analysis. The conversion of hemicellulose from α-cellulose (58.74 ± 5.74 to 75.24 ± 5.26 wt.%) increased the fiber's crystalline fraction. The rise in the crystallinity index (24.01–49.89%) of the optimally alkalized MAF verified the augmentation in the crystalline fraction. Removal of peaks at 2357, 1730, and 1245 cm^{-1} in the Fourier-transform infrared spectroscopy of Optimally Alkalized MAF (OAMAF) demonstrated a drop in amorphous fraction. Progress in the maximum degradation peak (298–320 °C) was established by thermogravimetric analysis. Scanning electron microscopic (SEM) pictures exposed the occurrence of the contamination, wax, and lignin-free outer layer in the OAMAF. Removal of elements in the energy-dispersive X-ray (EDX) spectrum of OAMAF confirmed elimination of contaminations present on the exterior of the fiber. Tensile strength (274.6 ± 29.5 to 307.3 ± 24.12 MPa) and tensile modulus (2.88 ± 1.026 to 4.633 ± 0.94 GPa) of MAF were also enhanced after the optimal NaOH treatment.

Keywords *Mucuna atropurpurea* fiber · Alkalization · Cellulose · Chemical analysis · Tensile testing

1 Introduction

Increasing environmental consciousness motivates scientists to replace conventional nonbiodegradable materials using new biodegradable materials [1]. Manmade fiber–reinforced polymers are widely used nonbiodegradable materials in different domains, namely, construction, automobile, military, packaging, and electronics [2]. However, new guidelines and recommendations of environmental agencies have restricted the usage of manmade fiber–reinforced polymers. Cellulosic fiber-based fiber-reinforced plastics are partially biodegradable and have mechanical properties similar to synthetic fiber–reinforced composites [3]. So, consumption of plant-based cellulosic fibers is increasing daily, creating demand for plant fibers. Jute, coir, sisal, and banana are commonly used plant fibers in fabricating plant fiber–reinforced composites [4, 5]. However, the present demand for cellulosic

fibers cannot be fulfilled by utilizing only conventional fibers. Searching for a new cellulosic fiber with suitable properties is the solution to meet the market demand. Fiber-yielding plants are abundantly available throughout the world. Studying the fundamental properties of fiber, namely, chemical composition, crystallographic information, mechanical properties, and thermal behaviors, is required. Cellulose, hemicellulose, lignin, and wax are common chemical constitutions present in fibers. Chemical composition of the fiber alters the fiber's characteristics [6]. The binding between cellulosic fibers and polymer resin largely relies on the surface topography of plant fibers. Generally, lignin, hemicellulose, wax, and pollutions occur at the exterior of the fiber, which weakens the binding ability with the matrix. Eliminating amorphous fractions and impurities from the fiber's surface may increase its binding ability with polymer resin [7]. Surface modifications are a proven method to remove the contaminants and amorphous fractions from the fiber surface [8]. Various researchers use sodium hydroxide treatment because of its low cost, simplicity, and effectiveness. Alkalization does not only eliminate the amorphous fraction in the fiber surface but also modify the chemical configuration of the fiber [9, 10]. These fluctuations in the chemical configuration may impact the fiber's crystalline, tensile, and thermal properties. Optimal alkalization

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ORIGINAL ARTICLE

Effect of *Cocos nucifera* shell powder on mechanical and thermal properties of *Mucuna atropurpurea* stem fibre-reinforced polyester composites

P. Senthamaraikannan[1] · S. S. Saravanakumar[1]

Abstract

This research examined the suitability of *Cocos nucifera* shell powder (CNSP) as a secondary filler in polyester composites reinforced with *Mucuna atropurpurea* stem fibre (MAF). The particle size analysis report revealed that the average size of the CNSP was 1265 nm. CNSP density (1530 ± 42.33 kg/m^3) was determined with the help of a liquid pycnometer. The chemical analysis of CNSP showed a higher cellulose content (45.21 ± 6.72 wt.%) and a moderate quantity of lignin fraction (26.78 ± 5.11) in the CNSP. From the X-ray diffractogram, the crystallite size (0.75 nm), and crystallinity index (37.57%) of the CNSP were calculated. The thermogravimetric study of CNSP proved that it could be used as a secondary filler in polymer composites where the fabrication temperature is below 200 °C. Atomic force microscopy revealed that CNSP has an average roughness of 9.791 nm. It was found that 30 wt.% MAF-reinforced and 6 wt.% CNSP-filled polyester composites delivered significant tensile strength (130.14 MPa) and flexural strength (140.21 MPa) than other composites with CNSP content of 0, 2, 4, 8, and 10 wt.%. Also, 30 wt.% MAF-reinforced and 10 wt.% CNSP-filled polyester composites showed improved impact strength (22.43 J/m) and hardness (108.22 HRRW). The thermogravimetric analysis (TGA) confirmed the improvement in the maximum degradation temperature after the addition of reinforcement and filler into the polyester resin. A scanning electron microscope was used to inspect the fractured cross section of the 30 wt.% MAF-reinforced and 6 wt.% CNSP-filled polyester composites.

Keywords *Cocos nucifera* shell powder · *Mucuna atropurpurea* stem fibre · X-ray diffraction analysis · Polyester resin · Mechanical testing · Thermal stability · Scanning electron microscope

1 Introduction

The awareness about the use of biodegradable materials is growing because of the initiative taken by the environmental regulatory bodies. So, researchers are concentrating on replacing non-biodegradable materials using eco-friendly materials in all sectors. fibre-reinforced plastics are widely used in the automotive industry [1, 2]. Artificial fibre-reinforced composites are mainly used for their light weight and high-strength nature, ease of fabrication, and low cost. Plant fibre-reinforced plastics are one of the best substitutes for synthetic fibre-reinforced plastics as they possess all the advantages of synthetic fibre-reinforced plastics. In addition, it is biodegradable [3]. So, the use of plant fibre plastics in the automotive sector is rapidly increasing, creating considerable demand for plant fibres. Previously, various researchers developed plant fibre-reinforced composites using commercially available jute, sisal, bamboo, coir, hemp, etc. However, it is challenging to meet the present market demand by using commercial fibres alone, encouraging researchers to develop non-commercially available fibre-reinforced composites. In this way, Senthamaraikannan and Saravanakumar (2022) recently developed untreated *Mucuna atropurpurea* stem fibre (MAF)-reinforced polyester composites and investigated their mechanical properties [4]. The properties of plant fibres are determined by various factors, such as fibre length, fibre weight fraction, matrix type, fibre surface condition, and the technique adopted for fabrication [5, 6]. Modifying the fibre's surface is one way to enhance the adhesive strength between the fibre and matrix,

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ORIGINAL ARTICLE

Cellulosic fiber extraction and characterization from derris scandens (Roxb.) benth root for polymer composite reinforcements

M. Prithiviraj[1] · **Rathinavel Subbiah[2]** · **P. Manimaran[3]** · **K. Kannan[4]**

Abstract
The utilization of natural lignocellulosic fibers as reinforcements in polymer composites has become increasingly popular in recent years. This research focuses on investigating the potential of Derris scandens (Roxb.) benth root fiber (DSBFs) as a reinforcing material in thermosetting polymer composites. The study begins by analyzing the properties and composition of DSBFs, using standardized testing methods. The single fiber tensile strength of DSBFs is determined to be 423 Pa at a strain rate of 4.01%, and they exhibit a Young's modulus of 79.45 GPa. Chemical analysis reveals that DSBFs are composed of helically coiled cellulose microfibrils, constituting 72.59 wt.%, held together by an amorphous lignin matrix and contain 9.69 wt.% hemicellulose and a low wax content of 0.3 wt.%. Thermal stability (TGA) analysis demonstrates that the fibers exhibit stability up to 340 °C, with a mass loss of 43.78%. X-ray diffraction analysis confirms the crystalline index of 18.16 nm and a crystalline size of 49.28%. 13C (CP-MAS) NMR spectroscopy yields the evidence for the presence of cellulose, hemicellulose, and lignin in DSBFs. Fourier-transform infrared spectroscopy (FTIR) identify functional groups and elemental composition of DSBFs. Surface morphology is analysed by atomic force microscopy (AFM) and optical microscopy. These findings suggest that DSBFs can find applications beyond their traditional use in Thai medicine.

Keywords *Derris scandens (Roxb.) benth* root fiber · Characterization · AFM · NMR · Optical microscopy · FTIR

1 Introduction

At present, there is a high demand for natural fiber-oriented materials due to their renewability and problem-free disposal. Although natural fibers show some lack of repeatability, they are more ecological and offers various other benefits when compared to synthetic fibers [1]. As such, natural fibers are being proposed as an appropriate alternative to synthetic fibers for many end products [2]. Natural fibers have significant features such as being low cost, biodegradable, light in weight, having a high strength-to-weight ratio, abundant availability, lower energy requirements for processing, low density, recyclability, non-corrosiveness, eco-friendliness, ease of handling, and lack of health-hazard components compared to synthetic fibers [2, 3]. Owing to these factors, natural fiber-based polymer composites have found major applications in the automobile, industrial, packaging, home appliances, construction, aeronautics, and naval industries [4] (Singh et al. 2018).

Natural fibers can be extracted from different parts of plants like barks, stems, leaves, roots, fruits, flowers, and seeds. Some previously experimented examples of plants from which fibers extracted are Azadirachta indica, Cordia dichotoma, Sida Cordifolia, Grewia optiva, Grewia tiliifolia, Prosopis juliflora, Sansevieria ehrenbergii, Luffa cylindrica, and Furcraea foetida [5]. These fibers have been found to be of great strength in polymer composites from various studies [6].

The length, diameter, and arrangement of cellulose in natural fibers from plants with longer lifespans are usually have a low spiral angle [7]. These plants grow

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ORIGINAL ARTICLE

Cenosphere filled epoxy composites: structural, mechanical, and dynamic mechanical studies

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Abstract

The present study referred to the lightweight cenosphere filled, and epoxy composites (0, 7.5, 15, and 22.5 vol.%.) developed with the help of the hot compression moulding process. To ensure the strength of composites, the prepared system was analyzed with tensile, flexural, impact properties, and dynamic mechanical characteristics discussed. Cenosphere-filled composites attained the maximum tensile strength of 19.5 MPa, which is 60% better than the neat epoxy. Adding cenosphere particles increases the tensile, flexural, and impact strength at a superior level. Dynamic mechanical analysis revealed that in 22.5 vol.% of cenosphere reinforced composites, energy dissipation and maximum storage modulus of 6 MPa was enhanced. The surface morphologies of the fractured specimens were characterized using scanning electron microscope (SEM). The morphological investigations indicate a good state of particle distribution in the epoxy matrix.

**Keywords** Epoxy composites · Cenosphere particle · FT-IR · Tensile · Flexural · DMA properties

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1 Introduction

Power plants in India produce about 600,000 tonnes of fly ash per day or 219 million metric tonnes of fly ash per year. In India, the majority of power plants (70%), as of now, have over 197 coal/lignite-based thermal power plants that run with a coal base. The burning of coal in the thermal power plant results in fly ash that generates 133 MTs of CFA (half yearly) (2021–2022), which is expected to exceed more than 1000 MT in 2031–32 [1, 2].

The majority of the fly ash that these thermal power plants produce is considered to be industrial waste. Many different research organizations' primary focus is recycling and discovering alternative applications for these types of industrial waste. In India, 56% of all fly ash was used in various engineering applications, the majority of which were associated with the cement industry. The application of fly ash covered in various sectors such as building and construction accounts for 50%, low-lying area fills for 17% of roads and pavement for 15%, dyke raising for 4%, and brick industries for 10% [3]. They are also frequently used in pressure vessels, ship hulls, and automobile industries, owing to their specific strength, stiffness, shrinkage, warpage reduction, and high-temperature resistance [4]. The remaining 44% of fly ash is a source of concern because of
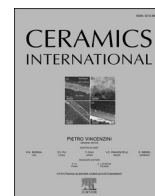
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Microstructure and tribological properties of microwave-sintered Ti0.8Ni–0.3Mo/TiB composites

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ARTICLE INFO

ABSTRACT

In this study, the Ti–0.8Ni–0.3Mo/XTiB (X = 5, 10, 15, and 20 wt%) composites were prepared using the microwave-sintering assisted powder metallurgy technique, and tribological properties were investigated. X-ray diffraction and scanning electron microscopy (SEM), with the microscope capable of energy dispersive spectroscopy (EDS), were used to characterize the mixed powder. The density and microhardness of the Ti–0.8Ni–0.3Mo/TiB composites were examined. The Ti–0.8Ni–0.3Mo/TiB composites exhibited a hardness of 260 HV, which is a 20% improvement over Ti–0.8Ni–0.3Mo. Tribological properties were studied by conducting experiments using a pin-on-disc wear tester at varying loads, sliding distances, and speeds. The Ti–0.8Ni–0.3Mo/TiB composites exhibited a reduction in wear loss and coefficient of friction values owing to TiB hardness and good bonding with the matrix. The tribological properties of the Ti–0.8Ni–0.3Mo/TiB composites were enhanced by the addition of TiB particles, which resist wear and friction.

1. Introduction

Titanium is the fourth most abundant structural metal in the Earth's crust-iron, aluminum, and magnesium being the first three [1]. Titanium is a ductile solid metal that is more potent than low-carbon steel and is 45% lighter than it. Despite being twice as strong as aluminum alloys, it is 60% heavier [1]. Titanium and its alloys are widely used in the industry owing to their excellent properties. Titanium exhibits poor surface shear strength and abrasion resistance prohibits its application in high dry sliding wear conditions [2–4]. Adding strong ceramic reinforcements to the titanium matrix phase is a feasible strategy to boost the bulk mechanical and tribological characteristics of titanium-based components [5]. Ceramic particle-rich regions play a vital role in enhancing the matrix material strength owing to their reinforcing effect. Several researchers [6–8] have explored the mechanical properties (such as tensile, fatigue, and creep) and manufacturing processes (e.g., powder metallurgy, extruding, and in situ processes) of titanium matrix composites (TMCs). Ti–Mo–Mn alloys are developed through liquid metallurgy methods for biomedical applications [9]. According to Ma et al. [10], TiC particles can enhance the grain refining and load-bearing strength of the Ti matrix. Most hard ceramic-reinforced titanium composites have been examined using mechanical tests, such as hardness,

tensile strength, and compression. TiC, Al_2O_3, SiC, $CaTiO_3$, GO, TiB, B_4C, and Y_2O_3 are the traditional reinforcements. These materials exhibit excellent strength and resistance to wear at high temperatures [10–16]. The effect of the TiB content on the microstructural evolution and mechanical response of the as-rolled fiber-like structural TMCs was systematically studied [17].

Powder metallurgy (PM) provides considerable benefits by physically shaping powders using various compaction and sintering processes [18]. PM is a cost-effective method for producing high-performance titanium components with improved mechanical behavior and corrosion resistance [19,20]. The utilization of TiC, TiB_2, B_4C, GNO, TiB, TiCN, and TiN reinforcements has been demonstrated in previous research using the powder metallurgy method, which is effective for improving the microstructural, mechanical, and tribological characteristics [21–25]. Titanium alloys and composites can be sintered to recreate inexpensive wrought-equivalent alloys, formulate unique low-cost compositions, and obtain completely dense materials Considering the nature of the alloy, the selected sintering method can be optimized to fine-tune the microstructural features thereby achieving improved physical and mechanical properties for a wide range of industrial applications [26].

Many studies have been conducted on titanium and its alloys to

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Physica Scripta

PAPER

Mechanical, thermal, electrical, and corrosion properties of microwave-sintered Ti-0.8Ni-0.3Mo/TiB composites

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Keywords: Ti-Ni-Mo composites, TiB, microwave sintering, conductivity, corrosion

Abstract

In this study, Titanium boride (TiB) reinforced Ti-0.8Ni-0.3Mo/XTiB (X = 5, 10, 15, and 20 wt%) composites were successfully fabricated by microwave sintering assisted powder metallurgy process. Scanning electron microscopy (SEM) coupled with energy-dispersive spectroscopy (EDS) and x-ray diffraction (XRD) analyses were used to evaluate the elemental powders individually. The distribution of TiB particles in the sintered Ti-0.8Ni-0.3Mo composites was observed using optical microscopy (OM) and SEM. The Microhardness of the microwave-sintered samples was evaluated through Micro Vicker's hardness testing machine. Thermal characteristics were estimated for temperatures ranging from 50 to 250 °C. The electrical conductivity of Ti-0.8Ni-0.3Mo/TiB composites was calculated from the measured resistance values using the four-point probe method at room temperature. The immersion method was performed to estimate the corrosion properties by suspending the sintered samples in 3.5% NaCl solution for 60 h. The morphology of the corroded surfaces was examined using SEM. The results revealed that Ti-0.8Ni-0.3Mo/15TiB possessed optimum hardness values from 220 to 260 HV, mechanical properties such as True yield strength from 728 to 814 MPa, ultimate compression strength from 1335 to 1680 MPa, fracture strain of 6.12 to 13.81%. It also revealed less weight loss in a corrosion medium of 0.6 g. The Ti-0.8Ni-0.3Mo/TiB composites had good properties in densification aspects, which is suitable for applications such as marine and airfare components.

1. Introduction

Titanium is the fourth most copious structural metal in the Earth's crust, behind iron, aluminum, and magnesium [1]. Titanium is a strong, lightweight metal that is more potent than low-carbon steel but 45% lighter in weight. However, it is 60% heavier than aluminum alloys, despite being more potent twice [2]. Because of its anticipated combination of biocompatibility, mechanical, and corrosion properties, titanium and its alloys are extensively used in bioimplants and biomedical applications [3]. Examples include aircraft structure and aero engines (high strength-to-weight ratio and creep resistance on elevated temperature), bio implants and biomedical devices (superior biocompatibility and excellent corrosion resistance), and equipment used in chemical processing industries (corrosion resistance) [4]. Pure titanium is strengthened by adding different alloying elements such as Al, Si, Zr, Cu, Fe, Ni, Nb, and Sn [5–15]. Titanium alloys can be categorized into three groups: α type, β type, and $\alpha+\beta$ type. Ti–6Al–4V alloy ($\alpha+\beta$ type) is popular among all other titanium alloys, representing more than 50% of the titanium market. The $\alpha+\beta$ type alloys are stronger and respond better to heat treatment than α alloys; however, they are less formable. The mechanical properties of Ti-6Al-4V alloy were enhanced by adding Mo and Ni by diffusion-modified surface alloying treatments [16].

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Effect of ionic liquids on the performance of dye-sensitized solar cells using poly(vinyl alcohol)/ polypyrrole based polymer electrolytes

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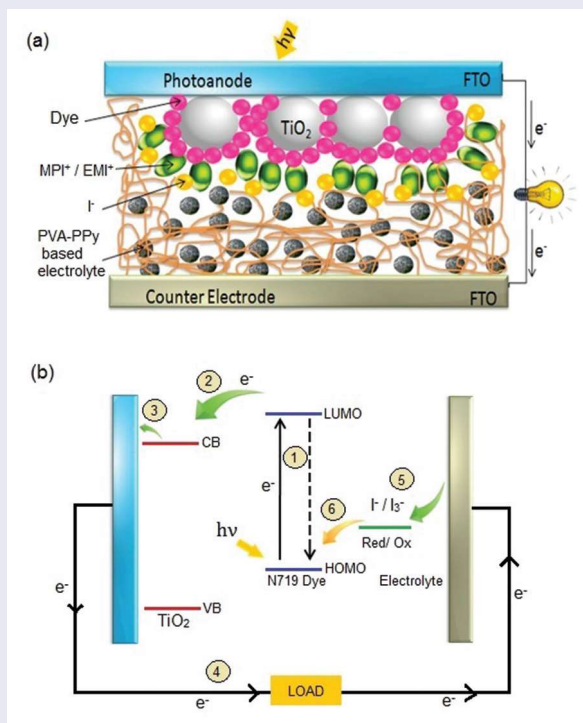
ABSTRACT

A novel quasi-solid-state polymer electrolyte was prepared using poly(vinyl alcohol)-polypyrrole, potassium iodide, iodine, and ethylene carbonate mixed with two types of ionic liquids, 1-methyl-3-propylimidazolium iodide (MPII) and 1-ethyl-3-methyli-midazolium iodide (EMII). The prepared polymer electrolyte was structurally characterized by FTIR spectroscopy. The lowest degree of crystallinity and activation energy were found in the MPII-incorporated polymer electrolytes. Higher values of dislocation density and microstrain are obtained for ionic liquid-incorporated polymer electrolytes. The lowest value of series resistance was observed in MPII-based polymer electrolyte and thereby the conduction was increased. The average roughness of the MPII-based polymer electrolyte at 17.901 nm was strongly dependent on the influence of the MPII content. The dye-sensitized solar cells (DSSC) built with MPII-based polymer electrolytes have achieved the highest photo-conversion efficiency of 4.51% under $100 mWcm^{-2}$ illumination.

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Physica Scripta

PAPER

Structural, morphological, and electrochemical studies of Mg$_2$SiO$_4$-Pr$_6$O$_{11}$ nanocomposite for energy storage applications

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Abstract

Owing to not only the high demand in the development of new materials for the energy storage applications but also the high abundance of magnesium orthosilicate (Mg$_2$SiO$_4$) belonging to olivine group of minerals in Earth, magnesium orthosilicate (called as MOS) nanoparticle and magnesium orthosilicate–praseodymium oxide (Mg$_2$SiO$_4$–Pr$_6$O$_{11}$) (MOS-PO) nanocomposite have been chosen to explore mainly their electrochemical characteristics. The MOS nanoparticle and MOS-PO nanocomposite were synthesized using sol-gel method. The characterization techniques such as x-ray diffraction (XRD), Scanning Electron Microscopy (SEM), energy dispersive x-ray (EDX) spectroscopy, Zeta potential analyzer, and Cyclic Voltammetry (CV) were used to investigate the structural, morphological, and electrochemical properties of the prepared samples. Using Scherrer's equation, phase identification was performed for the samples of MOS nanoparticle and MOS-PO nanocomposite with crystallite sizes 43 nm and 52 nm, respectively. The respective average particle sizes of 39 nm and 50 nm were observed for MOS nanoparticle and MOS-PO nanocomposite, using SEM images, and these values along with the images revealed the formation of spherical nanoparticles along with some agglomerates. The Zeta potential of the samples was calculated to analyze the stability of the nanoparticles. The electrochemical characterization was performed using the sample coated Mg foil as the working electrode and 0.5 M of KOH solution as the electrolyte, with the help of cyclic voltametric technique. The CV analysis was conducted ranging from 1.5 to -1.5 V at various scan rates of 25, 50, 100, 200, and 300 mVs^{-1}. For MOS-PO nanocomposite, the maximum specific capacitance of 1812 Fg^{-1} was observed at a scan rate of 25 mVs^{-1}. The results showed the possibility of the usage of MOS-PO nanocomposite material in the application of energy storage devices.

1. Introduction

Nanomaterials are eminent in all the technology disciplines as nanomaterials possess vital properties which include high strength, high hardness, extremely high diffusion rates, high catalytic activities, etc. Especially in the field of energy storage devices, nanomaterials play a crucial role in the development of batteries with high energy and power density [1]. It is well known in the electrochemical processes that the energy conversion in the energy storage devices mainly happens due to the chemical reaction occurred at the surface of the electrodes. Generally, nanomaterials provide more surface area; due to that fact when a particle size is reduced to nano scale, the surface area to volume ratio will increase drastically; hence, there will be an enhancement of number of reaction sites. Another reason for the implication of nanomaterials in the energy storage devices is that the kinetic processes of the energy storage devices such as batteries are mainly controlled by the mechanism which occurred within the device elements. Nanomaterials and nanocomposites are also helpful in the reduction of diffusion length and in the improvement of kinetic mechanisms, charge-discharge rate, and electron transport in the

Boosting Students' Energy with a One-Minute Activity to Improve English Language Learning

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Abstract:

The present study aims at teaching-learning process between the teachers and the students and also discusses students' perspective in responding and the teachers' awareness of those perspectives in foreign language. It includes nearly 20 classroom activities. The results indicate that there is a difference between teachers' perspective about students' performance and the students' perspective in answering. Both are two sides of a coin whereas one cannot withstand without the support of other. The result also expects the need to conduct more student teacher interactive activities in the classroom to make the learner to show more involvement in a foreign language and thereby enhances their learning ability. It is most important to remember that in this kind of classroom environment students are not just practicing using language but also experimenting with language, taking risks and making mistakes for successful language learning. The study also offers suggestions about One Minute Activity based on classroom with innovative tools and materials and its implementation in ELT setting.

Keywords: Teaching Learning Process, Activity Based Learning, Perceptions, One minute activity

Introduction:

English is an international language which is of a second language in the life Indians in his/her social scenario. Language learning should happen not only as a compulsion but also with enthusiasm. Enthusiasm can be earned through activity based learning. It helps the instructor to build strong relationship with the learners whereas instructor takes the role of facilitator. Through this learner centered approach, teacher moves a step away from traditional method of teaching and also gives importance for the students' opinion also. Motivating students to do indulge in activities enhance their intellectual as well as learning ability better than mere giving lecture by the teacher. This also makes the learners to come out of the clutches of traditional methods of leaning.

Enhancement of Proton Density Weighted Magnetic Resonance Images using Singular Value Decomposition in Wavelet Domain

K. Kannan*

Abstract
Image enhancement techniques for low contrast medical images using Singular Value Decomposition (SVD) in Discrete Wavelet Transform domain (SVD-DWT) are proposed in the literature. However, shift sensitivity, poor directionality and a lack of phase information are the primary drawbacks of the discrete wavelet transform. This work introduces a novel method of image enhancement (SVD-SWT) using SVD in Stationary Wavelet Transform (SWT) to improve the contrast of Proton Density weighted Magnetic Resonance Images (PD weighted MRI) while preserving the brightness. The low frequency sub bands of PD weighted MRI and the low frequency sub bands of General Histogram Equalized PD weighted MRI are used in the proposed method as a weighted sum of singular value matrices to enhance the contrast of PD weighted MRI. The proposed method is compared with several histogram equalisation methods and improvement techniques employing Singular Value Decomposition and Discrete Wavelet Transform (SVD-DWT). Discrete Entropy (DE), Average Brightness (AB), Pixel Distance (PD), and Standard Deviation (SD) all showed that the proposed method is the best.

INTRODUCTION

Professionals apply medical imaging methods with a high degree of precision, such as magnetic resonance imaging (MRI), computed tomography (CT), positron emission tomography (PET), and single-photon emission computed tomography (SPECT), to determine the physical characteristics of the human body. Different imaging methods preserve different characteristics and various sensors gather various imaging information of the part of the body being imaged. The size, shape and integrity of the grey and white matter of the body parts may be determined using a computer, a huge magnet, shim coils, gradient coils, a radio frequency transmitter and receiver coil, and other components of the Magnetic Resonance Imaging (MRI) system [1]. The shim coils homogenise the magnetic fields once they are produced by the magnet. The body component being photographed is exposed to radio frequencies from the radio frequency transmitter and a receiver coil picks up the signals that come back. The gradient coils enable the spatial localization of the radio signals and from the radio signals that were received, the computer created a magnetic resonance image. MRI system displays the tissue contrast which depends upon the pulse sequence parameters which are defined using

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RESEARCH ARTICLE

WILEY

Bipolar Fuzzy PROMETHEE-based Decision-Making Trust Model for guaranteeing data dissemination reliability in Internet of Things

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Summary

Internet of Things (IoT) is the rapidly growing domain that facilitates seamless connectivity to physical objects that makes them suitable and ideal entity of smart environment. The enforcement of trust between the physical objects is essential for completely utilizing the significant potentiality of these connected IoT objects. The traditional security strategies are not potent enough in provisioning comprehensive protection to the smart world. In this paper, Bipolar Fuzzy PROMETHEE-based Decision-Making Trust Model (BFPSMTM) is proposed for determining the outranking class that aids in superior trust estimation of interconnected IoT objects to guarantee reliable data dissemination. This BFPSMTM adopted different preference functions depending on the nature and type of criteria or attributes considered for evaluating the trust of the IoT objects during data dissemination. It utilized bipolar fuzzy number for assessing trust that represents an asymmetrical associated between the different judgmental factors considered for decision making. It represented the bipolar linguistic terms into trapezoidal bipolar fuzzy numbers to handle the issue of imprecise and vague knowledge during trust computation. It utilized a trapezoidal bipolar fuzzy number-based ranking function and identified the crisp real preferences of trusted IoT objects during data dissemination. It incorporated an entropy weighting information and computed the attribute weights based on the normality condition to prevent bias during trust estimation. The results of BFPSMTM confirmed improved throughput of 22.18%, reduced delay of 20.86%, minimized energy consumption of 19.32%, and better packet forwarding rate of 19.84%, with different number of IoT objects in the environment.

KEYWORDS
bipolar fuzzy number, entropy weighting, Internet of Things (IoT), linguistic terms, partial ranking, preference function, Preference Ranking Organization Method for Enrichment of Evaluation (PROMETHEE)

Multi focused Image Fusion using Fast Adaptive Bilateral Filter

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---**ABSTRACT**---

This paper presents Fast Adaptive Bilateral Filter (FABF) for fusion of Multi Focuses images. Multi Focused image fusion is used to combine one or more input image into single composite image, focusing all objects in the given scene. FABF filter sharpens the image without producing under and over shoot by increasing the edge slope. This paper uses this property to decompose the input image into high and low frequency images so that different fusion rules can be used for high and low frequency images to produce good quality composite image. The performance this FABF filter in Multi focused image fusion is compared with Adaptive Bilateral Filter (ABF) using Root Mean Square Error (RMSE), Spatial Frequency (SF) and Mutual Information (MI).

Keywords - Adaptive Bilateral Filter, Fast Adaptive Bilateral Filter, Multi Focused image fusion, Root Mean Square Error, Spatial Frequency and Mutual Information.

I. INTRODUCTION

Machine Vision application uses CCD and CMOS cameras in industries to capture the images of object of interest. Due to the limited depth of field in these cameras, it is possible to capture the clear image of the objects which are in focus only. The remaining objects in the scene which are not in focus will appear as blur. In this situation, Multi focus image fusion is used to combine two or more input images of the same scene with different focus to produce composite image in which all the objects in the scene are in focus. This composite image is called as Multi focused image. This image provides more comprehensive information about the scene which is useful for human perception & machine vision applications and reduces the storage capacity. A good multi focused image fusion method is expected to preserve useful & relevant information from multiple input images in Multi focused image. It should avoid artifacts and noises. It should be robust to shifting, scaling and misregistration. Digital Image processing research community reported many literatures related to Multi focus image fusion methods. Even though, there is a requirement of novel image fusion methods for feature extraction and target recognition. Among the literatures, multi scale decomposition methods are very successful and showing good results. They use different data representation and different image fusion rules to produce Multi focused image [19]. But, in these methods introduces artifacts. To avoid these artifacts, optimization based fusion methods were proposed. Optimization methods took multiple iterations to generate Multi focused image which in turn removes the edge details. To preserve edge details in the Multi focused image, edge preserving fusion methods were introduced. These methods use two scale decomposition edge preserving filter for the purpose of fusion [10-14]. Popular two scale decomposition edge preserving filter are anisotropic diffusion filter [20]. This method decomposes each input

image into low and high frequency image. Multi focused images are formed by combining manipulated low and high frequency image. Even though edge details are preserved, it reflects the staircase effect. To avoid this staircase effect, fusion using Standard Bilateral filter (SBF) was proposed [17, 18, 21-23]. Unlike convolutional filters, BF uses two Gaussian kernel, one for range and another one for spatial. Even though, BF preserves edges, this filter is non-linear and computation intensive. An adaptive variant of BF, called Adaptive Bilateral Filter (ABF) was introduced for image sharpness enhancement along with noise removal [1], where the center and width of the Gaussian range kernel is allowed to change from pixel to pixel. While several fast algorithms have been proposed in the literature for ABF [2-5], most of them work only with a fixed range kernel. Fast algorithm for adaptive bilateral filtering whose complexity does not scale with the spatial filter width was proposed by Ruturaj G. Gavaskar and Kunal N. Chaudhury and this filter is called as Fast Adaptive Bilateral Filter (FABF) [7]. This paper compares and presents the performance of ABF and FABF in fusing multi focused images in terms of Root Mean Square Error (RMSE), Spatial Frequency (SF) and Mutual Information (MI). The following section overviews ABF and FABF proposed by Buyue Zhang & Jan P. Allebach and Ruturaj G. Gavaskar & Kunal N. Chaudhury respectively. Section 3 presents the multi focused fusion methodology and Section 4 discuss the performance of ABF and FABF. Finally, summary of this paper with conclusion is presented.

II. ADAPTIVE AND FAST ADAPTIVE FILTER

The bilateral filter proposed by Tomasi and Maduchi is widely used in image processing for removing the noise while preserving the edges. Unlike linear convolutional filters, the bilateral filter uses two kernels namely range kernel and spatial kernel, where both are Gaussian kernels. An adaptive variant of the bilateral filter was introduced