

3.4.4 Number of books and chapters in edited volumes/books published per teacher during the last five years (5)

3.4.4.1: Total number of books and chapters in edited volumes / books published, and papers in national/international conference-proceedings year wise during last five years

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
CIVIL										
1	SUJIT KUMAR PRADHAN	Airfield and Highway Pavements 2019: Testing and Characterization of Pavement Materials	Effectiveness of polanga oil as rejuvenator for asphalt with high RAP content.	International airfield and highway pavement conference		INTERNATIONAL	2019	https://doi.org/10.1061/9780784482469.012		ASCE
2	A. K. Bhoi, J N MANDAL, A. JUNEJA	Circular Economy in the Construction Industry	Interface Shear Strengths between Bagasse ash and Geogrid	Proceeding of "9thIconSWM-CE 2019, India.	9thIconSWM-CE 2019, India.	INTERNATIONAL	2019	https://www.taylorfrancis.com/chapters/edit/10.1201/9781003217619-21/interface-shear-strengths-bagasse-ash-geogrid-aditya-kumar-bhoi-jnanendra-nath-mandal-ashish-juneja	IGIT Sarang, IIT Bombay	
3	Sahu, S. K., and Sahoo, D. R.,	Case Studies in Construction Materials	Shear behaviour of non-prestressed concrete beams reinforced with high-strength steel stirrups"	5th International Bridge Conference (SIBC 2019), Tehran, Iran.		INTERNATIONAL	2019			
4	Sahu, S. K., and Sahoo, D. R.	Journal of Structural Engineering	Suitability of high-strength steel as shear reinforcement in concrete beams"	16th Symposium on Earthquake Engineering (16SEEE), IIT Roorkee		INTERNATIONAL	2018	Paper no 268		
5	Kar R K and Kar Manaswinee		Rural connectivity through PMGSY in India,	Proceedings International conference on transportation infrastructure Projects- Conception to execution, IIT, Roorkee		INTERNATIONAL	2019		IIT, Roorkee	
6	Bikash Chandra Panda		Unconfined Compressive Strength of Geopolymer Cement	International Conference on Artificial Intelligence in Manufacturing & Renewable Energy (ICAIMRE) 2019	ICAIMRE-2019	INTERNATIONAL	2019	http://dx.doi.org/10.2139/ssrn.3551123		
7	Aditya Kumar Bhoi	Advancements in Unsaturated Soil Mechanics	Feasibility Study of Bagasse Ash as a Filling Material		GeoMEast 2019	INTERNATIONAL	2019	978-3-030-34206-7 https://link.springer.com/chapter/10.1007/978-3-030-34206-7_7		Springer Nature, Switzerland

8	Aditya Kumar Bhoi	Lecture Notes in Civil Engineering, Springer	Behaviour of Geosynthetics Clay Liner Under Direct Shear Test	Proceedings of the Indian Geotechnical Conference 2019		INTERNATIONAL	2019	978-981-33-6346-5 https://link.springer.com/chapter/10.1007/978-981-33-6346-5_1		Springer, Singapore
		ELECTRICAL								
9	Dr. Pranati Das		Bio-Medical Image Enhancement Using Adaptive Multi-Resolution Technique	2019 International Conference on Applied Machine Learning (ICAML)	2019 International Conference on Applied Machine Learning	International	2019	ISBN-978-1-7281-3909-8 https://ieeexplore.ieee.org/document/8989332	IGIT, Sarang	IEEE
10	Dr. Pranati Das	Advances in Intelligent Systems and Computing ((AISC,volume 846)	2DOF-PID controller-based load frequency control of linear/nonlinear unified power system	International Conference on Intelligent Computing and Applications	International Conference on Intelligent Computing and Applications	International	2019	ISBN-978-981-13-2181-8 https://link.springer.com/chapter/10.1007/978-981-13-2182-5_23	IGIT, Sarang	Springer Nature
11	Chinmay Kumar Nayak	Advances in Intelligent Systems and Computing ((AISC,volume 1039)	Optimal Participation of Hybrid Renewable Energy Sources in Standalone Microgrid	International Conference on Intelligent Computing, Information and Control Systems	International Conference on Intelligent Computing, Information and Control Systems	International	2019	ISBN-978-3-030-30465-2 https://link.springer.com/chapter/10.1007/978-3-030-30465-2_17	IGIT, Sarang	IEEE
12	Bibhu Prasad Ganthia		Carbon Reduction Potential Study in Combined Hybrid System for Rural Electrification	Materials Today: Proceedings	Materials Today: Proceedings	International	2018	2214-7853 https://www.sciencedirect.com/science/article/abs/pii/S2214785317323155	IGIT, Sarang	Elsivier
		MECHANICAL								
13	Sudhanshu Bhushan Panda, Narayan Chandra Nayak, Antaryami Mishra,	Lecture Notes on Data Engineering and Communications Technologies	Characterization & Optimization of Tool Design of an Injection molded part through Mold-Flow Analysis	Advances in Data Science and Management Proceedings of ICDSM 2019,	ICDSM 2019	International	2019	doi.org/10.1007/978-981-15-0978-0_45. (Scopus indexed)	IGIT Sarang	springer
14	Laxmikant Swain, Rabi Narayan Sethi, A.K. Chaubey, and SilaniSahoo	Advances in Production and Industrial Engineering	Fabrication and Characterisation of Aluminium Matrix Composite (Al 2024) Reinforced with Zircon Sand and Flyash	Advances in Production and Industrial Engineering, Springer Publication	ICETMIE 2019	International	2019	ISBN-978-981-15-5518-3 https://link.springer.com/chapter/10.1007/978-981-15-5519-0_20	The NorthCap University, Gurgaon, India, Indian Institute of Technology Delhi, New Delhi, Delhi,	springer
15	Dr. B.B.Choudhury	Advances in Intelligent Systems and Computing	Dynamic behaviour analysis of an industrial robot using FEM			International	2018	Print ISBN978-981-13-0513-9 https://link.springer.com/chapter/10.1007/978-981-13-0513-9		springer
16	Supriya Sahu	Advances in Intelligent Systems and Computing	Dynamic behaviour analysis of an industrial robot using FEM			International	2018	Print ISBN978-981-13-0513-9 https://link.springer.com/chapter/10.1007/978-981-13-0513-9		springer

17	Dr. B.B.Choudhury	Advances in Intelligent Systems and Computing	A fuzzy logic based finite element analysis for structural design of a 6 axis industrial robot	Proceedings of the International Conference on CIDM 2017	IEEE Symposium on Computational Intelligence in Data Mining	International	2019	ISBN-978-981-10-8055-5 https://link.springer.com/chapter/10.1007/978-81-322-2731-1_18	IGIT Sarang	Springer
18	Dr. B.B.Choudhury	Advances in Intelligent Systems and Computing	Artificial intelligence (AI) based object classification using principal images	Proceedings of the International Conference on CIDM 2017	IEEE Symposium on Computational Intelligence in Data Mining	International	2019	978-981-10-8055-5 https://link.springer.com/chapter/10.1007/978-81-322-2731-1_13	IGIT Sarang	Springer
19	Dr. B.B.Choudhury	Smart Innovation, Systems and Technologies	Path planning of mobile robot using PSO algorithm	Information and Communication Technology for Intelligent Systems	ICTIS 2018	International	2019	ISBN-978-981-13-1742-2 https://link.springer.com/chapter/10.1007/978-981-13-1742-2_51	IGIT Sarang	Springer
20	Dr. B.B.Choudhury	Advances in Intelligent Systems and Computing	Inverse kinematics solution of a 6-DOF industrial robot	Soft Computing in Data Analytics	SCDA 2018	International	2019	978-981-13-0514-6 https://www.springerprofessional.de/en/a-fuzzy-logic-based-finite-element-analysis-for-structural-design/6970560	IGIT Sarang	Springer
21	Dr. B.B.Choudhury	Advances in Intelligent Systems and Computing	An effective path planning of a mobile robot	Soft Computing in Data Analytics	SCDA 2018	International	2019	978-981-13-0514-6 https://www.sciencedirect.com/science/article/pii/S095741742300756X	IGIT Sarang	Springer
22	Dr. B.B.Choudhury	Lecture Notes in Networks and Systems	Stress and Modal Analysis of Six-Axis Articulated Robot Using ANSYS	Information and Communication Technology for Competitive Strategies	ICTCS 2017	International	2019	978-981-13-4458-9 https://link.springer.com/chapter/10.1007/978-981-13-0586-3_31	IGIT Sarang	Springer
23	Dr. B.B.Choudhury	Lecture Notes in Networks and Systems	Modeling and control of a six-wheeled mobile robot	Information and Communication Technology for Competitive Strategies	ICTCS 2017	International	2019	978-981-13-4458-9 https://link.springer.com/chapter/10.1007/978-981-13-0586-3_33	IGIT Sarang	Springer
24	Dr. B.B.Choudhury	Advances in Intelligent Systems and Computing	A Dynamic Bottle Inspection Structure	Proceedings of the International Conference on CIDM 2017	IEEE Symposium on Computational Intelligence in Data Mining	International	2019	978-981-10-8055-5 https://link.springer.com/chapter/10.1007/978-3-030-30271-9_20	IGIT Sarang	Springer
25	Mr. P.R.Dhal	Part of the Learning and Analytics in Intelligent Systems book series (LAIS, volume 5)	Fabrication and Study of Mechanical Properties of Human Hair Reinforced Linear Low Density Polyethylene Composite	Applications of Robotics in Industry Using Advanced Mechanisms	ARIAM 2019	International	2019	ISBN https://link.springer.com/chapter/10.1007/978-3-030-30271-9_3 978-3-030-30271-9	IGIT Sarang	springer

26	Dr. D.K.Behera	Advances in Intelligent Systems and Computing	A New Howard–Crandall–Douglas Algorithm for the American Option Problem in Computational Finance	Computational Intelligence in Data Mining	CIDM 2017	International	2019	978-981-10-8055-5	IGIT Sarang	springer
27	Dr. D.K.Behera	Advances in Intelligent Systems and Computing	An Efficient Solution of an Optimization Problem in Financial Engineering	Soft Computing in Data Analytics	SCDA 2018	International	2019	978-981-13-0514-6 https://link.springer.com/chapter/10.1007/978-981-13-0514-6_3	IGIT Sarang	springer
28	Dr. D.K.Behera	Advances in Intelligent Systems and Computing	A New Static Cost-Effective Parameter for Interconnection Networks of Massively Parallel Computer Systems	Soft Computing in Data Analytics	SCDA 2018	International	2019	978-981-13-0514-6 https://link.springer.com/chapter/10.1007/978-981-13-0514-6_15	IGIT Sarang	springer
29	Dr. J. Nayak	Lecture Notes in Electrical Engineering	Thermal Performance Analysis of a Box-Type Solar Cooker with Finned Pot: An Experimental Approach	Advances in Smart Grid and Renewable Energy	ETAERE-2016	International	2018	978-981-10-4286-7 https://link.springer.com/chapter/10.1007/978-981-10-4286-7_57	IGIT Sarang	springer
30	Dr. J. Nayak	Lecture Notes in Electrical Engineering	Study of AGC in Two-Area Hydro-thermal Power System	Advances in Power Systems and Energy Management	ETAERE-2016	International	2018	978-981-10-4286-7 https://link.springer.com/chapter/10.1007/978-981-10-4394-9_39	IGIT Sarang	springer
31	Dr. J. Nayak	Materialstoday Proceedings	An economic rural electrification study using combined hybrid solar and biomass-biogas system			International	2018	https://www.sciencedirect.com/science/article/abs/pii/S2214785317323131	IGIT Sarang	Elsevier
32	Dr. S Sahu	Lecture Notes in Networks and Systems	Stress and Modal Analysis of Six-Axis Articulated Robot Using ANSYS	Information and Communication Technology for Competitive Strategies	ICTCS 2017	International	2019	978-981-13-4458-9 https://link.springer.com/chapter/10.1007/978-981-13-0586-3_31	IGIT Sarang	Springer
33	Dr. A. padhi	Lecture Notes on Multidisciplinary Industrial Engineering	Mechanical Characterization of Hybrid Carbon–Glass-Reinforced Polypropylene Composites	Advances in Computational Methods in Manufacturing	ICMM 2019	International	2019	978-981-32-9072-3 https://link.springer.com/chapter/10.1007/978-981-32-9072-3_65	IGIT Sarang	Elsevier
34	Mr. Sudhanshu Bhushan Panda	Lecture Notes on Data Engineering and Communications Technologies	Characterization & Optimization of Tool Design of an Injection molded part through Mold-Flow Analysis	Advances in Data Science and Management Proceedings of ICDSM 2019,	ICDSM 2019	International	2019	doi.org/10.1007/978-981-15-0978-0_45. (Scopus indexed) https://link.springer.com/chapter/10.1007/978-981-15-0978-0_45	IGIT Sarang	springer
		CHEMICAL								
35	Dr. H. Sutar, R. Murmu, Prof. D. Roy, Prof. S.C. Mishra	Advances and Trends in Physical Science Research (pp.154-177)	Plasma Sprayed Red Mud-Fly Ash Composite Coatings on Mild Steel: A Comprehensive Outline		Advances and Trends in Physical Science Research		2019	ISBN (Print) : 978-93-89246-00-1		



36	Dr. H. Sutar, R. Murmu		High Density Polyethylene (HDPE) and polypropylene (PP) blend: An Experimental Approach		New Advances in Materials Science and Engineering		2019	ISBN(Print): 978-93-89246-08-7		
37	Dr. H. Sutar, Prof. D. Roy, Prof. S. C. Mishra and R. Murmu		Study of Sliding Wear Behavior of Plasma Sprayed Red Mud Composite Coatings on Mild Steel		Book Publisher			ISBN (Print): 978-93-89816-04-4		
		Metallurgy								
38	SR Rana, AB Pattnaik, SC Patnaik		Comparison of wear behaviour and mechanical properties of as-cast Al6082 and Al6082-T6 using statistical analysis	IOP Conference Series: Materials Science and Engineering, 338 (2018) 012050	ICPCM	International	2019	doi:10.1088/1757-899X/338/1/012050 https://iopscience.iop.org/article/10.1088/1757-899X/338/1/012050	NIT Rourkela	IOP Publishing,
39	J Parida, S C Mishra and S C Pattnaik		Study on Microstructure and Tribological Properties of Plasma Processed LM6 Alloy	Materials Science and Engineering, 653 (2019) 012009,	ICPCM	International	2019	doi:10.1088/1757-899X/653/1/012009, p1-5. https://iopscience.iop.org/article/10.1088/1757-899X/653/1/012009	NIT Rourkela	IOP Publishing,
40	S K Sahoo, J Majhi, A B Pattnaik, J K Sahoo and Swagat Das		Mechanical properties enhancement and microstructure study of Al-Si-TiB ₂ in situ composites	IOP Conf. Series: Materials Science and Engineering 338 (2018) 012060	ICPCM	International	2018	doi:10.1088/1757-899X/338/1/012060 https://iopscience.iop.org/article/10.1088/1757-899X/338/1/012060	NIT Rourkela	IOP Publishing,
41	Kanhu Charan Sahoo, Sunil Goyal, K. Laha	Procedia in structural integrity	Assessment of creep deformation and rupture behaviour of 304HCu austenitic stainless steel	ProcediaEngineering, vol. 14, pp. 60-67.	Second Structural Integrity and Conference and Exhibition (SICE-2018),	International	2018	https://www.sciencedirect.com/science/article/pii/S2452321619300095	Organized by DMRL, Hyderanad	Elsevier
42	Mr. S K Sahoo, J.K Sahoo, J. Pany		Studies on In-situ TiB ₂ reinforced Al-Si Alloys Synthesised by Stir Casting Method	Conference on Equipment & Material for Aluminum Industries...Success through Synergy	(EMAS-2018), NALCO, Angul, IIM Angul Chapter, 15th-16th Dec 2018	National	2018	https://www.sciencedirect.com/science/article/abs/pii/S2214785320318952	IIM Angul Chapter	
		ETC								
43	Dillip Dash		A Deep Learning Approach for SAR Image Fusion		International Conference on Intelligent Computing, Instrumentation and Control	International	2019	978-1-7281-0283-2 https://ieeexplore.ieee.org/document/8993376	IGIT Sarang	IEEE

44	Kodanda Dhar Sa		A Deep Learning Approach for SAR Image Fusion		International Conference on Intelligent Computing, Instrumentation and Control	International	2019	978-1-7281-0283-2 https://ieeexplore.ieee.org/document/8993376	IGIT Sarang	IEEE
45	DEBAPRIYA PARIDA		An efficient forward error correction based OFDM technique for digital video broadcasting	Communication and Signal Processing (ICCSP), 2017 International Conference on	2017 International Conference on Communication and Signal	International	2018	Electronic ISBN:978-1-5090-3800-8 https://ieeexplore.ieee.org/document/8286567	IGIT, Sarang	IEEE
46	DEBAPRIYA PARIDA		A real time implementation of spectrum sensing system using software defined radio	Intelligent Computing, Instrumentation and Control Technologies (ICICT), 2017 International Conference on	2017 International Conference on Intelligent Computing, Instrumentation and Control	International	2018	Electronic ISBN:978-1-5090-6106-8 https://ieeexplore.ieee.org/document/8342631	IGIT, Sarang	IEEE
47	Dillip Dash		Optimal Coverage Area Analysis for Target Localization in Multistatic Radar		International Conference on Applied Electronics Signal	International	2018	978-1-5386-8333-0 https://ieeexplore.ieee.org/document/9033195	IGIT Sarang	IEEE
48	Dillip Dash		Multi-focus Image Fusion using Pixel Level Deep Learning Convolutional Neural Network		International Conference on Intelligent Computing and	International	2018	978-1-5386-8113-8 https://ieeexplore.ieee.org/document/9065413	IGIT Sarang	IEEE
49	Kodanda Dhar Sa		DCT Based Multifocus Image Fusion of Wireless Sensor Network		International Conference on Inventive Communication and computational Technology	International	2018	978-1-5386-1974-2 https://ieeexplore.ieee.org/document/8473005	IGIT Sarang	IEEE
50	Kodanda Dhar Sa		Time Frequency Analysis of OFDM-LFM Waveforms for Multistatic Airborne Radar		International Conference on Inventive Communication and computational Technology	International	2018	978-1-5386-1974-2 https://ieeexplore.ieee.org/document/8473233	IGIT Sarang	IEEE
51	Kodanda Dhar Sa		Optimal Coverage Area Analysis for Target Localization in Multistatic Radar		International Conference on Applied Electronics Signal	International	2018	978-1-5386-8333-0 https://ieeexplore.ieee.org/document/9033195	IGIT Sarang	IEEE
52	Kodanda Dhar Sa		Multi-focus Image Fusion using Pixel Level Deep Learning Convolutional Neural Network		International Conference on Intelligent Computing and	International	2018	978-1-5386-8113-8 https://ieeexplore.ieee.org/document/9065413	IGIT Sarang	IEEE

53	Soumya Ranjan Mishra		Wide Band Filtenna with Inductively Loaded SRR for Ku-Band Application		International Conference on Recent Innovations in Electrical, Electronics &	International	2018		VSSUT, Burla	IEEE
54	Soumya Ranjan Mishra		Defected Ground Inspired Microstrip Filtenna for Wireless Application		International Conference on Applied Electromagnetics, Signal Processing and	International	2018		VSSUT, Burla	IEEE
55	Dr Urmila Bhanja		Stepped Poly Gate In _{0.53} Ga _{0.47} As/InP MOSHFET to Enhance the Device Performance		2018 IEEE Electron Devices Kolkata Conference (EDKCON)	National	2018	Electronic ISBN:978-1-5386-6415-5 https://ieeexplore.ieee.org/document/8770420		IEEE
56	Dr.(Mrs)Urmila Bhanja		Managing Impairments in wavelength routed transparent optical networks: Revised approach		National conference on advanced manufacturing & management systems for	National			IGIT Sarang	
57	Dr.(Mrs)Urmila Bhanja		A survey on the optical code division multiple access for the security management		National conference on advanced manufacturing & management systems for	National			IGIT Sarang	
58	Dr.(Mrs)Urmila Bhanja		Impairment aware fuzzy logic controlled dynamic routing and wavelength assignment		International IEEE conference ICBEIA,2011	International			IGIT Sarang	IEEE
59	Dr.(Mrs)Urmila Bhanja		Urban Traffic Flow Optimization		2018 13th IEEE Conference on Industrial and Information	International	2019	https://ieeexplore.ieee.org/document/8721414	IGIT Sarang	IEEE
60	Dr.(Mrs)Urmila Bhanja		Stepped Poly Gate In _{0.53} Ga _{0.47} As/InP MOSHFET to Enhance the Device Performance	Proceedings of International conference on 2018 IEEE Electron Device Kolkata Conference (EDKCON)	2018 IEEE Electron Devices Kolkata Conference (EDKCON)	International	2019	ISBN: 978-1-5386-6415-5 https://ieeexplore.ieee.org/document/8770420	IGIT Sarang	IEEE
	CSE									
61	Anand, A., Ray, L.S.S., Sahoo, R.K., Sethi		Analysis of Attention Level of Human Body in Different Forms			International	2019	Print ISBN 978-981-13-1500-8 https://link.springer.com/chapter/10.1007/978-981-13-1501-5_3		Springer



An Economic Rural Electrification Study Using Combined Hybrid Solar and Biomass-Biogas System

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Abstract

One of the prime requirements for socio-economic improvement in any nation is the condition of consistent electricity provide systems. A huge quantity of the world's residents lives in isolated rural areas. This paper discusses the renewable hybrid power creation system which is proper for Khalardda village placed in Odisha. Every part of the load facts of the village is composed and as a result quantity of power to be created is designed. The technical, economic potential of solar PV-biomass-biogas hybrid system is considered.

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L.M. López-González *et al.*

[Contribution of Renewable energy sources to electricity production in the autonomous community of Navarre \(Spain\): A review](#)

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M.R. Nouni *et al.*

[Providing electricity access to remote areas in India: an approach towards identifying potential areas for decentralized electricity supply](#)

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N.H. Ravindranath *et al.*

[Assessment of sustainable non-plantation biomass resources potential for energy in India](#)

Biomass and Bioenergy (2005)

A.C. Caputo *et al.*



[Economics of biomass energyutilization in combustion and gasification plants: effects of logistic variables](#)

Biomass and Bioenergy (2005)



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Carbon Reduction Potential Study in Combined Hybrid System for Rural Electrification

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Abstract

One of the prime requirements for socio-economic improvement in any nation is the condition of consistent electricity provide systems. A huge quantity of the world's residents lives in isolated rural areas. This paper discusses the renewable hybrid power creation system which is proper for Khalardda village placed in Odisha. The technical, economic potential of solar PV-biomass-biogas hybrid system is considered. Here saving from the carbon reduction calculated which can be used for the village development.

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[Economics of biomass energyutilization in combustion and gasification plants: effects of logistic variables](#)

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Design and Analysis of Gravitational Search Algorithm Based TCSC Controller in Power System

Bibhu Prasad Ganthia^a  , Prashanta Kumar Rana^b, Tapas Patra^c, Rosalin Pradhan^d, Rajashree Sahu^d

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Abstract

In present era, the main contact of the power segment engineers is to expand the ability and immovability of the current power segment for attractive system presentation and dependable process. This directs to the growth of FACTS technology. FACTS controllers raise power conveys ability and constancy. This article represents representing and simulation of single machine infinite bus (SMIB) system with TCSC controller. Thyristor Controlled Series Capacitor (TCSC) controller is exercised to improve transient constancy of the SMIB system. In this article propose of TCSC controller is projected. The form of SMIB with TCSC and PID controllers are expanded in MATLAB for simulation. Three phase symmetrical faults are initiated to learn its characteristics. The simulation effects confirm that the constancy of the power system is being developed by TCSC controller and it efficiently damp out the power system oscillations.

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Application of power system stabilizers for enhancement of overall system stability

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P. Kundur

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N.G. Hingorani *et al.*



Understanding FACTS: concepts and technology of flexible AC Transmission Systems

(2000)

There are more references available in the full text version of this article.



A Variable Structured TCSC Controller for Power System Stability Enhancement

Bibhu Prasad Ganthia ^a  , Aditi Abhisikta ^b, Deepanwita Pradhan ^c, Anwes Pradhan ^d

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<https://doi.org/10.1016/j.matpr.2017.11.131> 

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Abstract

In present era, the main contact of the power segment engineers is to expand the ability and immovability of the current power segment for attractive system presentation and dependable process. This directs to the growth of FACTS technology. FACTS controllers raise power convey ability and constancy. This article represents representing and simulation of single machine infinite bus (SMIB) system with TCSC controller. Thyristor Controlled Series Capacitor (TCSC) controller is exercised to improve transient constancy of the SMIB system. In this article propose of TCSC controller is projected. The form of SMIB with TCSC and PID controllers are expanded in MATLAB for simulation. Three phase symmetrical faults are initiated to learn its characteristics. The simulation effects confirm that the constancy of the power system is being developed by TCSC controller and it efficiently damp out the power system oscillations.

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Application of power system stabilizers for enhancement of overall system stability

Power Systems, IEEE Transactions on (1989)

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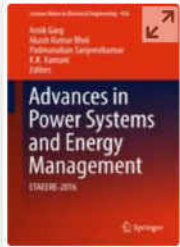
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N.G. Hingorani *et al.*

Understanding FACTS: concepts and technology of flexible AC Transmission Systems



Advances in Power Systems and Energy Management pp 393–401

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Study of AGC in Two-Area Hydro-thermal Power System

[Bibhu Prasad Ganthia](#) , [Anita Pritam](#), [Krishna Rout](#),
[Siddhartha Singhsamant](#) & [Jayashree Nayak](#)

Chapter | First Online: 28 November 2017

1163 Accesses | **7** Citations

Part of the book series: [Lecture Notes in Electrical Engineering](#) ((LNEE, volume 436))

Abstract

Energy lack trouble united with fresh lofty petroleum cost has effected in strict crashes to various technical parts. In the past various decades, huge quantity of usual capitals of the earth have been unlimitedly used, and our living setting has been strictly razed and infected. An electrical grid may have several types of generators and loads; generators should be

TID Controller in Two Area Multi Unit Power Systems with SMES and HVDC Link

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Abstract—Change in frequency with load is a great concern. In this paper a load frequency problem is address by taking two area power systems with hydro and wind power plant in each unit in the first instant. Then SMES and HVDC link is introduce in the system to improve the system performance. In all the cases TID controller is used and the parameters of controller, SMES and HVDC link are tuned using Differential Evolution (DE) algorithm. The whole system is design in MATLAB/SIMULINK model; different load pattern is applied in place of step load and results show that with SMES and HVDC link the improvement of system occurs in terms of deviation of frequency and tie line power.

Keywords— Load Frequency Control (LFC); Tilted Integral Derivative (TID); Differential Evolution (DE) algorithm; High Voltage Direct Current (HVDC); Superconducting magnetic energy storage system (SMES).

I. INTRODUCTION

The increasing demand of load forced to install more generators, as most of the power generating through thermal power plant leads to burning of more fuel hence environment pollution. The fossil fuel energy is limited which force to think about the renewable energy sources. One of such energy is wind energy which can contribute a good amount of power to the grid. But the disadvantages with the wing energy that the speed throughout the year is not constant lead to design of automatic voltage regulator, controller and better optimization technique. Till now so many paper has been published taking thermal power systems. But in the different state of India where coal energy is not available but hydro energy is plenty available we can thing about synchronizing hydro and wind energy and supply the energy to the consumers. Again such type of systems can be interconnected by tie line so the reserve capacity can be reduce and can supply deficit power to the needed area. In the load frequency control problem the area control error is fed to the controller to minimize the frequency and tie line power deviation [1-2]. In this paper a two area power system with hydro and wind power plant in each area is taken in the first instant. The proposed model is design in MATLAB/SIMULINK with TID controller, where the parameters are tuned using DE algorithm. As we know if there is any mismatch occurs in between generation and demand leads to change in frequency. And if the deviation

is large the system may collapse [3-4]. This problem can be minimized by installing fast acting energy storage devices. But installing such devices in all the units make the system price increase. So different power electronic devices can be installed in the power system to increase the power transmission capability [5-6].

Sometime due to slow response of governor it is not capable of making the frequency fluctuation minimum. In that case a fast response active power source like Superconducting magnetic energy storage system (SMES) can be used to improve the dynamic performance [7]. As SMES can capable of controlling reactive and active power flow it can be used as a vital component for frequency stabilization. The effective use of SMES to control frequency oscillation is demonstrated in the paper [7].

II. DESCRIPTION OF SYSTEM

In this paper a two area power system with hydro and wind power plant in each area is taken for simulation study. Further a SMES and HVDC link is connected in each area and performance of the system is analyzed.

A. Modelling of Hydro power plant

The Hydro unit; consisting of governing system, turbine, generator and load are design using SIMULINK by transfer function of the corresponding equations [8].

B. Modelling of SMES

The ability of the SMES is that it can store the electrical energy in the form of magnetic energy and capable of sending huge amount of power instantaneously. In pratap et al. [7]; model the SMES and connect in the power system to investigate the system. The model for SMES is shown in Fig. 1. K_{SMES} and T_{SMES} are the gain and time constant of the SMES respectively.

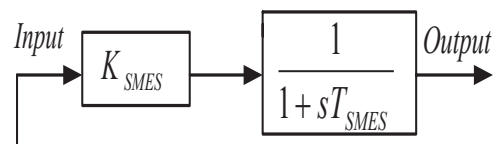


Fig. 1. Structure of SMES

Battery Energy Storage System for Solar PV and Wind Power Smoothing Considering Economic Aspects



Chinmay Kumar Nayak and Manas Ranjan Nayak

Abstract This paper introduces an avant-garde method to minimize the uncertainty in power output of a hybrid PV and wind plant (HPW) with the help of BESS which stores excess power generated and supplies the load when the renewable power generated is insufficient. Hence, BESS, in a way, smoothes the HPW power output. Here, the simulation was carried out for an IEEE-RBTS basic system to optimize the size of the solar PV arrays, wind turbine and BESS so that obtained annual cost benefit would be maximized. For cost benefit analysis of the system, economic loss as a result of electricity outage and BESS costs were taken into account.

Keywords Solar photovoltaic · Wind energy · Battery energy storage system · Power system reliability · Techno-economic analysis

1 Introduction

Harnessing renewable energy like solar and wind energy and utilizing it to meet global electricity demands is challenging as these sources are uncertain and unpredictable. Integrating them to a conventional thermal powered distribution system poses a great deal of problems to the control and scheduling. In case of renewable power generation more than that is required for the load, the system has to divert the power flow elsewhere to maintain the power system stability. High rush of power from PV and wind units accompanied with drastic fluctuations in

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Economic and Technical Analysis of the Power System with Electric Vehicles Enabling G2V and V2G



Kumari Kasturi, Chinmay Kumar Nayak and Manas Ranjan Nayak

Abstract Adoption of electric vehicles (EVs) is globally accepted as an alternative option in transportation sector due to energy crisis and environmental issues. EVs' role in the form of vehicle to grid discharging is an advanced concept in evolution of smart grid in power system. A practical driving pattern is chosen for EVs. Salp Swarm Algorithm (SSA) optimization technique is used to obtain the optimal number of EVs and location of electric vehicle charging station (EVCS) in distribution network in order to minimize feeder power loss cost, cost of power drawn from the main grid and EV owner power purchase cost. It is verified that the algorithm does not only provide the social optimality—minimizing the impact of EV charging/discharging on the grid and utility's operating cost—but also satisfies EV owners' charging preferences.

Keywords Electric vehicle · Distribution system · Salp Swarm Algorithm · Vehicle to grid charging

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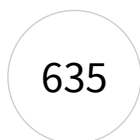
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Energy Characterization of Bluetooth in Opportunistic Mobile Crowdsensing Platform



Kalyani Sahoo, Ramesh K. Sahoo and Srinivas Sethi

Abstract Smart environment services provide latest information and communication technologies to boost the different activities of citizens. Sensing is one of the necessary parameters to observe present status of infrastructures and environment. In this paper, it has been planned to analyze the performance of the Bluetooth with its characterization in mobile crowdsensing platform. Bluetooth has emerged as a promising platform for short-range wireless networking. It has been proposed a model to find out the energy spent and power consumption by considering three parameters: Bluetooth, Wi-Fi, and LTE.

1 Introduction

Crowdsensing is a technique that enables to assemble a huge quantity of data by permitting an extensive variety of data sources from the crowd to contribute data, and sometimes Crowdsensing is referred as mobile Crowdsensing (MCS)[1, 2]. The sensing and computational ability of mobile devices increase with the development of mobile technology. According to involvement, Crowdsensing is classified into 2 types: participatory Crowdsensing and opportunistic Crowdsensing. The users voluntarily involve by contributing information in participatory Crowdsensing, whereas the data can be sensed, collected, and shared without any user intervention in opportunistic Crowdsensing. Data collection, data storage, and data upload are three processes in mobile Crowdsensing. All three processes are interrelated to each other.

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EFFECT OF MICRO SILICA ON GEOTECHNICAL PROPERTIES OF EXPANSIVE SOILS

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ABSTRACT: A difficult problem in Civil engineering works exist, when the sub grade is found to be expansive soils. Expansive soils have a tendency to swelling when their moisture content is allowed to increase. This moisture may come from rains, floods, leaking sewer lines or from the reduction of surface evaporation when an area is covered by a building or pavement. Frequently, these expansive soils cause the cracking and breaking up of pavements, railways, highway embankments, roads, foundations and channel or reservoir linings. In recent decades, using by-products of industries to avoid accumulation and keep environment pure and safe is a necessity. Micro silica is one of such by products which are harmful for human health and environment. Due to rapid growth of urbanization and industrialization, minimization of industrial waste is serious problem in present days. To encounter this innovative and non-traditional research on waste utilization is gaining importance now a days. The aim of this research is to investigate the effect of micro silica addition on the behaviour of expansive soils.

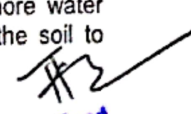
Keywords: Expansive soils, Micro Silica, swelling, foundations and pavements

1. INTRODUCTION

Expansive soil is commonly known as black cotton soils, because of their color and their suitability for growing cotton. Black cotton soil is one of the major regional soil deposits in India, covering an area of about 3.0 lakh sq.km. Expansive soils are problematic soils because of their inherent potential to undergo volume changes corresponding to changes in the moisture regime. When they imbibe water during monsoon, they expand and on evaporation thereof in summer, they shrink. Because of this alternate swelling and shrinkage, structures founded on them are severally damaged. In India, black cotton soils have liquid limit values ranging from 50 to 100%, plasticity index ranging from 20 to 65% and shrinkage limit from 9 to 14%. The amount of swell generally increases with increase in the plasticity index. The swelling potential depends on the type of clay mineral, crystal lattice structure, and cation exchange capacity, ability of water absorption, density and water content. Swell in the vertical direction is called heave. Among the illite, kaolinite and montmorillonite clay minerals, the montmorillonite possesses the greatest ability to swell by illite. The Kaolinite does not swell. Black cotton soils are very hard in dry state and possess high bearing capacity. In summer, it is very common to see shrinkage cracks with hexagonal columnar structure, with vertical cracks as wide as 10 mm extending up to a depth of 3m or more. Soils containing expansive clays become very sticky when wet and usually are characterized by surface cracks when dry. Therefore, the presence of surface cracks is usually an indication of an expansive soil.

1.1 Expansive Mechanism

Water molecules consist of two hydrogen atoms sharing electrons with a single oxygen atom. The water molecule is electrically balanced but within the molecule, the offsetting charges are not evenly distributed. The two positively charged hydrogen atoms are grouped together on one side of the larger oxygen atom. The result is that the water molecule itself is an electrical "dipole", having a positive charge where the two hydrogen atoms are situated and a negative charge on the opposite or bare oxygen side of the molecule. The electrical structure of water molecules enable them to interact with other charged particles. The mechanism by which water molecules become attached to the microscopic clay crystals is called "adsorption". Because of their shape, composition and of resulting electrical charge, the thin clay crystals or "sheets" have an electro-chemical attraction for the water dipoles. The clay mineral "montmorillonite", which is the most notorious in the smectite family, can adsorb very large amounts water molecules between its crystalline sheets and therefore has a large shrink-swell potential. When potentially expansive soil becomes saturated, more and more water dipoles are gathered between the crystalline clay sheets, causing the bulk volume of the soil to increase or swell.


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Urban Traffic Flow Optimization using Intelligent Techniques

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Abstract— This work describes optimization of traffic flow in an urban area using different intelligent techniques such as Evolutionary algorithm (EA), Simulated Annealing (SA) and a proposed novel Hybrid Evolutionary algorithm and Simulated Annealing (EA-SA) Technique. The proposed work focuses on communication between vehicles and road side unit (RSU) referred as Vehicle to Infrastructure (V2I) architecture. Vehicles store their locations and destinations in a central server. The central server is assumed to compute the best path for each of these vehicles using different intelligent techniques and vehicles receive information regarding the route that consumes least time. The fitness function minimizes the total traffic flow in an urban area by estimating the best possible routes for each of the vehicles and optimizing the total travel time. The Petri net model is used to validate the proposed work. In this work, a novel hybrid Evolutionary algorithm and Simulated Annealing technique referred as hybrid EA-SA is proposed to optimize the traffic flow in an urban area. The proposed hybrid EA-SA is validated with a traffic queue near a traffic junction. The traffic junction makes the vehicles wait for a certain fixed time interval or for a variable time interval and hence, creates a queue. The first part of the work focuses on optimization of traffic flow without any queue or waiting time near a junction. Furthermore, performance of the proposed approach is analyzed in presence of a traffic light controller near a junction with fixed and variable green time interval. The vehicles wait near a junction for a fixed time interval referred as fixed green time interval irrespective of the size of queue at a junction. Vehicles waiting time is also varied near a traffic junction referred as variable green time interval.

Keywords— Urban Traffic, Petri net (PN) Model, Evolutionary Algorithm, Simulated Annealing Algorithm, Hybrid EA-SA

I. INTRODUCTION

Traffic congestion occurs in an urban transport network due to vehicular queuing, which is accompanied by slower speeds. Due to the revolution in automobile industries since recent decades, the numbers of vehicles have been increasing day by day. Though the number of vehicles is increasing, it is impossible to expand or restructure the roads

every time to meet the new demands. This affects the standard of living of individuals by wasting a lot of time in traffic jams. Hence, there is a need to create a global system that automates the urban traffic system by computing the most appropriate route with different parameters such as current position of the vehicles, the desired destination of driver, shortest possible distance with minimum travel time. There are many existing traffic models in [1-3].

Authors in [2] have discussed AGTTPM (Adaptive Gray Threshold Traffic Parameter Measurement) technique to minimize traffic congestion on a transportation system with the Petri net model. The AGTTPM system obtains average vehicle speed for each road section. In the AGTTPM system, estimated travel time of each of the vehicles in terms of cost is easily computed for each road section. The authors find the least traveling time of all the vehicles within a certain period of time (T). However, the computation is done without incorporating a traffic light controller.

Dezani et al. have addressed a new approach to optimize the urban traffic flow [3]. A new fitness function is developed to find the least cost route in terms of shortest path for the vehicles. The authors have estimated the time taken by a vehicle to reach its destination using Dijkstra's Algorithm (DA) and Genetic Algorithm (GA) and found that GA is better as compared to the Dijkstra's Algorithm. However, the authors have not considered the waiting time of vehicles near the traffic light junction [3]. In [4], authors have demonstrated optimization of traffic flow in an urban traffic flow junction and validated using hybrid Petri net model. In this model, the waiting time of vehicles near a traffic junction is considered.

Authors in [5] have proposed a system that controls traffic light in both manual and automatic mode. In manual mode, traffic light is controlled by a traffic police by pushing the button for a green signal. However, in automatic mode traffic light controller uses LED sequences, which change according to a predefined pattern that helps to optimize flow of traffic [5].

In [6], authors have used two algorithms such as Dijkstra's Algorithm (DA) and Genetic Algorithm (GA) to find the best possible routes for the vehicle in the presence of traffic light controller. Traffic light controller fixes the green time interval for a fixed time for all the vehicles passing through the junction referred as fixed green time interval. Traffic light controller fixes the green time interval for variable time for all the vehicles passing through the junction referred as variable green time interval. It is found that

Stepped poly gate $In_{0.53}Ga_{0.47}As/InP$ MOSHFET to enhance the device Performance

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Abstract— A new group $In_{0.53}Ga_{0.47}As/InP$ stepped poly gate Metal Oxide Semiconductor Heterostructure Field Effect Transistor (MOSHFET) has been proposed, which exhibits a significant improvement in On current, transconductance, threshold voltage, and On-state resistance without affecting the off state performance. The proposed device is simulated using 2D Sentaurus TCAD simulator. In the proposed structure the stepped gate (SG) region is divided into three steps with different oxide thickness from source to drain. The first and third sections of the gate are made up of p+ poly and the second section is of n+ poly. By using the poly gate, the simulation results of stepped gate MOSHFET persists lesser gate to drain capacitance, as a result there is an approximately 23% improvement On current, 31% improvement of On resistance, 16% improvement of transconductance and 44% improvement of threshold voltage roll off as compared to conventional MOSHFET.

Keywords— $In_{0.53}Ga_{0.47}As/InP$, Stepped gate, narrowband, wideband, On-resistance and transconductance.

I. INTRODUCTION

Design of bulk Si MOSFET is very difficult at sub 20nm regime due to the substantial increase of short channel effects (SCE) [1]. To overcome the SCEs, there are various gate engineering technology such as double-gate (DG) MOSFET, Fin FET, underlap and overlap structures are introduced [2]. Among these, the DGMOSFET is one of the potential candidates in device research, due to its reduced leakage current and improved sub-threshold-slope. For better switching, the device drive current must be high at the lower supply voltage. However, the device suffers from redundant standby power dissipation due to the increase in leakage current [3].

Group III-V based semiconductors as channel materials are now very popular due to its better thermal conductivity, higher electron mobility and greater saturation velocity [4-5]. Moreover, the group III-V based MOSFETs possess higher injection velocity (v_{inj}) due to low field carrier mobility and the lower effective mass (m^*) [6]. In spite of that, high electron mobility III-V semiconductors are being extensively used as channel materials for upcoming highly scaled CMOS applications, due to the significant transport advantage as compared to bulk Si. The lattice-matched based material system offers large CBO/VBO, which is mostly suitable for

heterostructure design. A large CBO/VBO provides a sufficient barrier at the center of the narrow-band channel, which helps the carriers to confine within the channel [7]. However, $In_{0.53}Ga_{0.47}As/InP$ is considered as a good channel material due to its excellent electron mobility and high saturation velocity [8-11]. However, the small value of CBO in $In_{0.53}Ga_{0.47}As/InP$ can be improved with the use of work function engineering and modulation doping [12]. Due to the smaller band gap, $In_{0.53}Ga_{0.47}As$ has a significant band to band tunneling (BTBT) leakage current, which limits their scalability beyond 20 nm [13].

The stepped gate MOSHFET is introduced in order to achieve the improvement of On-state resistance, transconductance [14]. But the introduction of the gate underlap concept in nanoscale MOSHFET minimizes the gate delay and reduces the Off-state current [15]. Stepped gate devices achieved low power dissipation and high speed due to the significant reduction of parasitic capacitances between the source and the drain, which ultimately causes a reduction in the Off-state leakage current [16].

Due to the smaller oxide thickness near the source end, an excellent electrostatic gate control is reached, which helps to enhance the mobility in the channel region, as a result there is an increase in drain current. Again larger oxide thickness at drain end gives lower On- resistance. On the fabrication point of view, LDMOS (Laterally Diffused MOS) using stepped gate has been successfully presented by Lin et.al [17]. Further the process simulation for realization of advance multi material and multi- layer stepped gate LDMOS has been fabricated by using several techniques like chemical and mechanical processing, blanket reactive ion etching (RIE), metal wet etch process [18].

In the proposed work, a simulation-based study of device performances of $In_{0.53}Ga_{0.47}As/InP$ heterostructure stepped gate MOSHFET is presented. Till date there are several single and double gate based on $In_{0.53}Ga_{0.47}As/InP$ heterostructures are reported, but no work is based on the stepped poly gate. For the proposed structure the device performances like On-state resistance, transconductance and On current are analyzed without much less affecting the off state performance. The model has been simulated and analyzed using 2D Sentaurus TCAD simulator.



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This work describes optimization of traffic flow in an urban area using different intelligent techniques such as Evolutionary algorithm (EA), Simulated Annealing (SA) and a proposed novel Hybrid Evolutionary algorithm and Simulated Annealing (EASA) Technique. The proposed work focuses on communication between vehicles and road side unit (RSU) referred as Vehicle to Infrastructure (V2I) architecture. Vehicles store their locations and destinations in a central server. The central server is assumed to compute the best path for each of these vehicles using different intelligent techniques and vehicles receive information regarding the route that consumes least time. The fitness function minimizes the total traffic flow in an urban area by estimating the best possible routes for each of the vehicles and optimizing the total travel time. The Petri net model is used to validate the proposed work. In this work, a novel hybrid Evolutionary algorithm and Simulated Annealing technique referred as hybrid EA-SA is proposed to optimize the traffic flow in an urban area. The proposed hybrid EA-SA is validated with a traffic queue near a traffic junction. The traffic junction makes the vehicles wait for a certain fixed time interval or for a variable time interval and hence, creates a queue. The first part of the work focuses on optimization of traffic flow without any queue or waiting time near a junction. Furthermore, performance of the proposed approach is analyzed in presence of a traffic light controller near a junction with fixed and variable green time interval. The vehicles wait near a junction for a fixed time interval referred as fixed green time interval irrespective of the size of queue at a junction. Vehicles waiting time is also varied near a traffic junction referred as variable green time interval.

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A Dynamic Bottle Inspection Structure

Santosh Kumar Sahoo, M. Mahesh Sharma and B. B. Choudhury

Abstract In our market, most of the products are available in jars or bottles. So in view of maintaining proper specification of a particular bottle, the same should be properly investigated. The proposed bottle inspection has been concentrated through an artificial intelligent (AI) model and the performance of the said also evaluated. For this analysis, about 5000 bottle models are taken and their different properties have been considered for meeting large information to and from a data set, out of which they are categorized into two classes like defect-free and defective bottles. For analysis, an artificial intelligent scheme has been followed along with vision builder simulation tool which is carried out with a core i3 processor.

Keywords Artificial intelligent (AI) • Vision builder simulation tool
Machine vision (MV) system

1 Introduction

The vision processes are attentive toward identifying real items in an image and assigning properties to that objects. Researchers are adding vision structures at different applications basically industries to optimize cost, higher efficiency, and consumer gratification. All machine vision (MV) system comprises a mixture of

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Modeling and Control of a Six-Wheeled Mobile Robot



Jayprakash Rout, Subham Agrawal and B. B. Choudhury

Abstract This paper is based on the motion of a mobile robot which is capable of working in a challenging environment. It is a six-wheeled mobile robot with four legs at each corner and other two attached to the middle of the plate. The legs are essential assemblies of robot because they play an important role in a contact with the ground and carry heavy loads. The robot can change its position in any direction. As a main part of the robot, a microcontroller is used which transfers the signal to the relay board and it controls the wheel motion indirectly. An ultrasonic sensor is used in this robot to help in detecting obstacles by emitting sonic wave. Primary object is to detect the distance between the sensors and object. Robot under study is found to be complex and a bit costlier compared to other robots, but it has the capability to traverse different kinds of obstacles. The robot has been modeled in CATIA and analyzed using ANSYS. Different amount of force up to 8 N has been taken and observation for total deformation of the structure, directional deformation in x-axis and y-axis of the robot, maximum principal stress, and minimum principal stress has been made by using structural steel as the material for the robot.

Keywords Mobile robot • Microcontroller • ANSYS • Solid model

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Path Planning of Mobile Robot Using PSO Algorithm



S. Pattanayak, S. Agarwal, B. B. Choudhury and S. C. Sahoo

Abstract Recent trends in path planning of mobile robot are emerging as preponderance research field. This paper presents particle swarm optimization (PSO) for optimizing the path length of the mobile robot. The proposed approach downsizes the path length for the mobile robot without any physical meeting of the obstacles between starting and destination point. This method uses a static environment for the estimation of path length between two points. Totally, six numbers of obstacles are taken into consideration for this evaluation work. MATLAB software was used for generating the programs for the PSO approach.

Keywords Mobile robot • Path planning • PSO

1 Introduction

Expansion of the industries and their prerequisite for endless production, working in a hazardous situation, and unattended manufacturing operation limits the working of human beings. Thus, it is crucial to develop a robot that can be controlled through a cellular phone/laptop/remote controller. The determination of path through which the robot reaches its goal point is a challenging task for the designer.

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Stress and Modal Analysis of Six-Axis Articulated Robot Using ANSYS



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Abstract Industrial robots are used in pick and place, and various other operations in industries. So in this paper, the aim is to find out the stresses and modal analysis of different points of a six-axis industrial robot to determine its maximum shear stress, natural frequencies, and mode shapes. The optimum stress and modal analysis are done by finite element analysis (FEA) using the ANSYS workbench. For this analysis, the mesh size is taken as 0.01 mm. Different values of loads are applied on the griper to find out the maximum value of stress. For modal analysis, different cracks on the robot are considered. The modal shapes and natural frequencies for robot with crack and without crack are compared to find the weak part on the robot structure so that any design modifications can be done in order to make the robot more efficient for industrial work.

Keywords ANSYS workbench • FEA • Industrial robot • Mode shapes
Stress analysis

1 Introduction

ARISTO is a six-axis articulated robotic arm having six axes such as base, shoulder, elbow, wrist, pitch, and roll. Modal analysis is performed to find the fundamental frequencies (modes) and their associated behavior (mode shapes). This can be done by analyzing the deformation shape of structure from FEA model. High deformation area can be used for sensors placement as it can capture accurately the frequency response. Stress analysis gives the idea about the weak part of the robot

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Structural Integrity Mechanics and Creep Life Prediction of 304HCu Austenitic Stainless Steel Under Multiaxial State of Stress

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Abstract For increasing the efficiency of fossil power plants, the boiler tube material has to withstand higher temperature and pressure which calls for extensive research for identifying materials having high-temperature strength, good corrosion resistance and adequate mechanical properties. The 304HCu stainless steel 9304HCu SS is one of the candidate materials for boiler tubes employed in advanced ultra-super critical power plants. However, under above circumstances, material will subject to multiaxial state of stress that arises from internal pressure, weld joint, inhomogeneous structure, sudden change in dimension and change in cross section of the tube. Present study aims to introduce multiaxial state of stress through notches of different root radius on creep samples. Notch of different root radii, e.g. 0.25, 0.5, 2.5 was creep tested by keeping notch throat diameter 5 mm. Both plain and notch specimen had creep tested at same stress level at a particular temperature. Notch specimen possesses higher rupture life as compared to plain specimen. Based on these observations, the material is found to be 'notch strengthening'. Then both SEM and optical micrograph were carried out on the unfailed notch which revealed that cavity density was decreased from notch root towards centre for relatively sharper notch, while random distribution of cavity for shallow notch. FE analysis has been carried out to understand the contribution of different components of stresses, i.e. von-Mises, maximum principal and hydrostatic stresses. Different models given by Cane, Hayhurst and Nix were examined for creep life prediction under multiaxial state of stress. The average hardness near to notch root was more in comparison with regions away from the notch root and shallow notch was found exhibit more hardness in comparison with sharper notch.

Keywords AUSC · Multiaxial creep · Finite element analysis
Life prediction · Hardness measurement

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