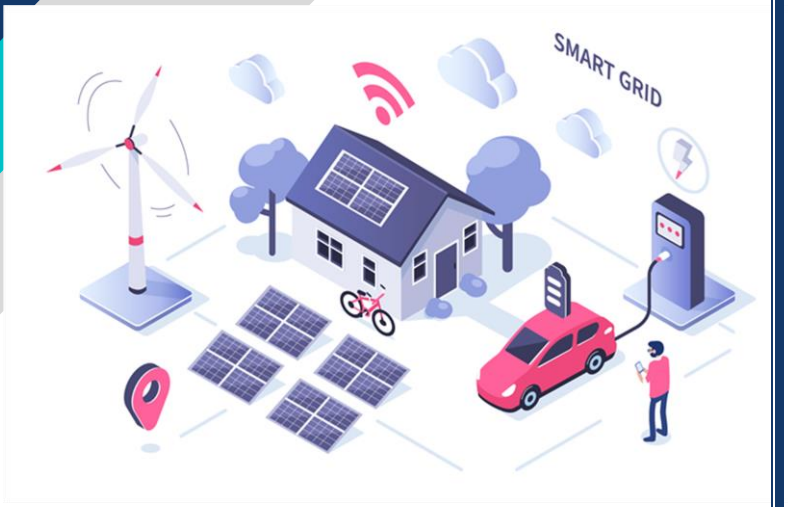
Proceedings of

International Conference on Smart Grids, Structures & Materials (ICSGSM-2021)

19th -20th April 2021



KL UNIVERSITY (DEEMED TO BE)

Department of

ELECTRICAL AND ELECTRONICS ENGINEERING

GRADE A++ ACCREDITED BY National Assessment and Accreditation Council

CATEGORY 1 UNIVERSITY RECOGNISED BY UGC

About K L E F

The K L University is situated in a spacious 60-acre campus on the banks of Buckingham Canal of river Krishna near Vijayawada city in the emerging capital region of Amaravati. The K L University is a pioneer in the field of education and research. It was established as K L College of Engineering in year 1980. The college was made autonomous in the year 2006 and accorded the status of a deemed university in 2009.

The University offers 10 B. Tech programs in engineering, three in non-engineering stream. 11, five – year integrated degree programs and twelve 2-year M. Tech programs. It also offers full-time / part-time Ph. D programs in Engineering / Commerce / Management and Sciences. The University has five laboratories built in collaboration with industrial organizations like IBM, Microsoft, CISCO, Oracle, and Altair Engineering. It has four advanced research centers on Robotics, Embedded Systems, Bioprocessing and Microwave & Antennas with a view to train the young to become highly qualified and innovative engineers.

About Electrical & Electronics Engineering Department

The Department of Electrical and Electronics Engineering has highly qualified and experienced faculty. The department offers B. Tech and M. Tech programmes with specialization in Power Systems and in Power Electronics & Electrical Drives. The department also offers part-time and full-time Ph. D programme where over 160 scholars are working on topics with wide research base.

Vision

To be a globally renowned university.

Mission

To import quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all - round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

Messages

Er. KoneruSatyanarayana
President

It is my privilege to welcome you all to the "International Conference on Smart Grids Structures and Materials, ICSGSM-2021" organized by Electrical & Electronics Engineering Department during April 19 – 20, 2021. The theme of the Conference is very relevant to explore solutions to the present day, challenges faced by our Country in meeting the energy requirements. I am happy to note that there is overwhelming response from academic community to participate and deliberate on the issues related to the proposed topic. More than 230 researchers have submitted their papers to share their thoughts with other participants across the Globe.

The development of smart grid in India would result in minimizing the energy cost and in improved customer service. It would certainly play an important role in addressing global issues like energy security and climate change also. It will also make the energy system a transparent one with the participation of consumers in its operation and control. However, the development of smart grid in our country may take a decade or more but when realized certainly yield immense benefits to both the consumers and the power utilities. Thus, I strongly believe that this conference will provide sufficient platform by increasing awareness on smart grid and create fresh pool of skill and knowledge to pursue research on smart grid and renewable energy source by the faculty of Electrical and Electronics Engineering.

I convey my best wishes to the organizing committee of Electrical and Electronics Engineering Department, peers and other stake holders who are going to be associated with this conference. I wish all the delegates, distinguished academicians, and other participants for a pleasant and fruitful stay at our campus. I also wish the conference a grand success.

- President
KLEF

Sri. K. L. Havish
Vice President

It is my great pleasure to welcome you all to the "International Conference on Smart Grids Structures and Materials, ICSGSM-2021" organized by Electrical & Electronics Engineering Department during April 19-20, 2021.

The Technical Program Committee, undertook the difficult job of carefully evaluating the large number of submitted papers, considering the merits of each through detailed reviews and discussions at the committee meetings and selecting a technical program of the highest caliber.

This conference provides all attendees with the opportunities to meet and interact with one another. I take this opportunity to appreciate the organizing committee to conduct this internal conference, chairs and speakers for their participation and contribution; and all the members of various committees for their teamwork and follow – through. I hope that the conference will be more informative and enjoyable.

Wishing all the very best.

– Vice President
KLEF

Sri. K.RajaHarin
Vice President

It is with great pleasure that I extend a warm welcome "International Conference on Smart Grids Structures and Materials -ICSGSM 2021" organized by Electrical & Electronics Engineering Department during Aril 19-20,2021. I am truly proud that the Department of Electrical and Electronics Engineering has managed to organize such an important conference in the field of smart electric grid an important area of electrical engineering, which is attracting academic and industrial participation, nationally and internationally. I am sure that this conference will achieve its intent – to serve as an effective platform for the research community to learn, share and supplement each other's research, while keeping abreast of the latest trends in this arena.

This conference, I hope, true to its theme, will address some of the design challenges in the design and integration of energy and electrical grids with communication and network technologies, along with substantial questions of security and privacy of different components within the grid. This conference aims at providing an opportunity to discuss various engineering challenges of smart energy grid design and operation by focusing on advanced methods and practices for designing different components and their integration within the grid.

I congratulate Department of Electrical and Electronics Engineering for this astronomical effort.

– Vice President
KLEF

Dr. S. S. Mantha
Chancellor

It is my great privilege to welcome "International Conference on Smart Grids Structures and Materials" organized by Electrical & Electronics Engineering Department during April 19th -20th 2021.

On behalf of organizing committee of International Conference on Smart Grids Structures and Materials(ICSGSM - 2021), I am honored and delighted to welcome all the delegates and participants.

I congratulate the Program Committee for their thorough and timely reviewing of the papers submitted and selection of papers for presentation, meeting the high standards required for an International Conference. I must appreciate the involvement of Organizing Committee members who have all worked extremely hard in organizing the conference programs and other activities.

– Chancellor
K L E F

Dr. L. S. S. Reddy
Vice Chancellor

I am delighted and very happy that the Department of Electrical and Electronics Engineering is organizing the International Conference on Smart Grids Structures and Materials-ICSGSM 2021during April 19th-20th, 2021. This conference is a step towards achieving our vision in becoming a world – class academic and research institution.

This conference will be a good platform to interchange knowledge and skills in the field of Smart Electric Grid. It provides an opportunity for the researchers to find new solutions in this area and forecast future trends to realize India's aspiration and to contribute to global needs.

It is a great pleasure to welcome all delegates and participants to this conference; I would like to congratulate the Department of Electrical and Electronics Engineering, K L E F Deemed to be University for their commitment and superb drive in organizing this conference. I am very certain that this occasion will be able to provide a platform towards strengthening our relationships in knowledge sharing while at the same time provide the necessary thrust in joint research collaborations and product commercialization within the research society. It is my aspiration that this conference will be a foundation for the growth of new ideas towards a better tomorrow.

I wish this conference a great success.

– Vice Chancellor
K L E F

Dr. Celia Shahnaz
Chair, IEEE-Bangladesh, BUET -Bangladesh

Dear colleagues,

It is encouraging to celebrate the "SMART GRIDS STRUCTURES AND MATERIALS" International Conference K L E F Deemed to be University to gather experts in the field of electrical, electronics, computers, and communications. It is even more encouraging, the conferencethat gathered researchers from academia, industry, and the students to attend the conference. This combines three important ingredients to succeed as a technical society developing technology to make our lives better. On one hand, we have the academia in close contact with students, the future engineers that very soon will take over the role of being highly qualified professionals in technical companies. On the other hand, we have researchers in industry to show their latest advances to transform research into real products.

This scenario is an ideal place to collaborate and to meet new players in the field. People from academia not only can share their knowledge with their peers but also can establish collaborations with companies and even with other research groups. At the same time, students, either pre-graduate and graduate, have the opportunity to be in close contact with the future world.

We should take the ICSGSM-2021during 19 -20 April 2021, event as an excellent opportunity to share our advances in the field, to create synergies between different researchers in academia and industry, to analyze how technology is evolving, and finally to motivate our young engineers to do it better than us.

I wish you the best experience and grand success.

Chief Guest
ICSGSM-2021

Dr.D P Kothari
Former Director, IIT Delhi

A conference is a place where true meetings of minds happen. Researchers who would have done a good deal of thinking about their idea, will come forward and share their thoughts with fellow researchers. The beauty of a conference such as ICSGSM-2021 is that it allows such exchanges which in turn will ignite more ideas and ways of improving the presented ideas. The biggest beneficiaries hence will be the attendees who truly participate. I thank and congratulate the organizing team and KLEF Deemed to be University for enabling innovation through a conference such as ICSGSM.

With the blurred boundaries between domains, technologies getting merged and less compelling technologies practically disappearing, we need to be updated on how our world is evolving and changing. We can use of ICSGSM 2021to add value to ourselves, our research, and our communities. Wish you all a great conference and enjoy the discussions.

Guest of Honour
ICSGSM-2021

Dr. K. Subba Rao

Principal, K L College of Engineering, General Chair

International Conference on Smart Grids Structures and Materials- ICSGSM 2021 during 19-20, April 2021 aims to bring together leading academic scientists, researchers, and research scholars to exchange and share their experiences and research results about all aspects of Emerging Smart Grid Technologies. It also provides the premier interdisciplinary and multidisciplinary forum for researchers, practitioners, and educators to present and discuss the most recent innovations, trends and concerns, practical challenges encountered, and the solutions adopted in the field of Smart Grid Technologies.

I would like to express my appreciation to all authors for their outstanding contributions and in particular the members of the program committee for their competent evaluation of the large number of submissions, invited session chairs for their careful preparation of the invited sessions.

I wish this conference will be a grand success.

– Principal
K L College of Engineering

Dr. J. Somlal

Professor, EEE department, K L E F, General Chair

International Conference on Smart Grids Structures and Materials- ICSGSM-2021 aims to bring together leading academic scientists, researchers, and research scholars to exchange and share their experiences and research results about all aspects of Emerging Smart Grid Technologies. It also provides the premier interdisciplinary and multidisciplinary forum for researchers, practitioners, and educators to present and discuss the most recent innovations, trends and concerns, practical challenges encountered, and the solutions adopted in the field of Smart Grid Technologies and cutting edges research in various fields.

I would like to express my appreciation to all authors for their outstanding contributions and in particular the members of the program committee for their competent evaluation of the large number of submissions, invited session chairs for their careful preparation of the invited sessions.

I wish this conference will be a grand success.

-Prof. & Head, EEE
K L College of Engineering

Dr. A. Pandian
Convener, ICSGSM-2021

I feel proud to be the Convener for International Conference on Smart Grids Structures and Materials ICSGSM 2021 during 19-20, April2021, organized by the Department of Electrical and Electronics Engineering, College of Engineering, K L E F Deemed to be University. This International Conference – (ICSGSM-2021) provides an opportunity to bring together the academia, the practicing engineers as well as the researchers from educational institutions, and research organizations to 'exchange views, experiences and expertise. These aspects will in turn lead to development of new technologies in Smart Electric Grid. I am sure that technical papers presented during the conference will be quite useful for all Academicians, Researchers, Scientists and Practicing Engineers.

There is an overwhelming response for this conference. A total of 146 papers were out of which 75 papers are selected for Oral Presentation at the conference and will be presented in six technical sessions. I thank all the sponsors. I take this opportunity to invite all the Researchers, Practicing Engineers for active participation in the International Conference.

I am whole heartedly thankful to our beloved President of KLEF, Er. K Satyanarayana guru for his motivation, constant encouragement, and continuous support without which, it is impossible to conduct this event. I am very much thankful to our Vice Presidents Sri. K. Lakshman Havish and Sri. K. Raja Harin for their inspiration and motivation in conducting this event. I thank Honorable Chancellor of KLU, Dr. S.S. Mantha for his encouragement to organize the conference. I also thank Honorable Vice Chancellor of KLU, Dr. L.S.S. Reddy for his valuable guidance and instinct support in organizing this conference, extend my thanks to entire faculty of department of EEE, K L University and Student Volunteers and Non – Teaching staff of the department and the college for their help in various stages of organization of the conference. I am thankful to all those who have directly or indirectly contributed to make this International Conference a memorable event. I take this opportunity to thank the reviewers and session chairs for sparing their valuable time to review the papers.

– Convener
ICSGSM-2021

Dr. P Srinivasa Varma
Co- Convener, ICSGSM-2021

As a Co-convener ofInternational Conference on Smart Grids Structures and Materials ICSGSM-2021 conducted by the Department of Electrical and Electronics Engineering, College of Engineering, K L E F Deemed to be University, Andhra Pradesh, during April 19th – 20th, 2021, warmly welcome to all participation.

The Conference on Smart Grids Structures and Materials is the premier international conference for presenting the very best research results, problem solutions, and insight on new challenges facing the field of the impact of Smart Grid Technologies, on the next generation energy consumption and it has been highly focused research and deployment venture which is of inter-disciplinary research in electrical, electronics, computer, instrumentation, automation, and communication engineering with AI & ML, dependability and security.

I wish to all the delegates for this gathering to share the knowledge in different fields.

Co-Convener
ICSGSM-2021

Prof. R B R Prakash **\Prof. T Vijay Muni**

Co-ordinator's, ICSGSM-2021

We the Co-ordinator's of International Conference on Smart Grids Structures and Materials ICSGSM-2021, are delighted to welcome all the participants for this knowledge share event of this conference aims at the coagulation of research ideas in monitoring, sensing, information security and IOT aspects of smart grids inclusion of EV's & technologies, besides the ideas of renewable power integration and power system reliability with re-structuring, by means of smart structures and materials for the future demand.

All the very best and grand success of this conference.

Co-Ordinator's

ICSGSM-2021

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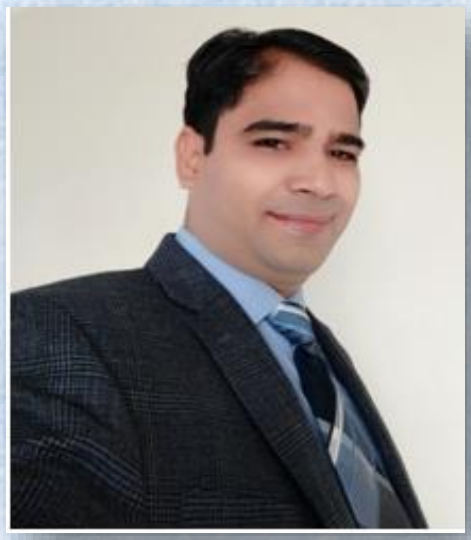
KEYNOTE SESSION

Prof. Ir. Dr. Ismail Musirin
UniversitiTeknologi MARA (UiTM), Malaysia

Prof. Dr. Jai Govind Singh
Asian Institute of Technology (AIT), Thailand

Prof. Dr. Celia Shahnaz (Chair, IEEE)
Bangladesh University of Engg. & Tech- Bangladesh.

Dr. Vijayalakshmi Saravanan
Vassar College, New York, USA



Udochukwu Bola Akuru
Tshwane University of Technology, South Africa

Dr

Dr. M. Rizwan
Delhi Technological University, Delhi- INDIA

Dr. L Ashok Kumar
PSG College of Technology, Tamil Nadu, INDIA

Dr.V.Karthikeyan
NIT Calicut, Kerala, INDIA

Two Day International Conference on Smart Grids, Structures and Materials
(ICSGSM2021)
19th & 20th April 2021

Organized by
Department of Electrical and Electronics Engineering
Program Schedule At-A-Glance

Day 1 ***April 19th 2021 (Monday)***

Time	Event	Virtual Link
9:00 AM – 10:20 AM	Key note Lecture on "Big Data & Data Science Applications" by Dr. Vijayalakshmi Saravanan, Vassar College, NY, USA	CLICK HERE TO JOIN!
10:20 AM - 10:30 AM	Break	
10:30 AM – 11:35 AM	Inauguration Program	CLICK HERE TO JOIN!
11.35 AM – 11:45 AM	Break	
11:45 AM – 1:00 PM	Session-1 Track -1A: Renewable Energy Sources Track- 1B: Smart Grid Technologies Track -1C: Power Electronics Control of Electrical Drives Track- 1D: Control and Automation	
1:00 PM – 1:30 PM	Break	
1:30 PM – 2:30 PM	Key Note Lecture on "Power Converters for Electrical Vehicle" by Dr. L. Ashok Kumar, PSG College of Technology, Coimbatore, Tamil Nadu	CLICK HERE TO JOIN!
2:30 PM – 2:35 PM	Break	
2:35 PM - 3.30 PM	Session-2 Track -2A: Renewable Energy Sources Track- 2B: Smart Grid Technologies Track -2C: Power Electronics Control of Electrical Drives Track- 2D: Control and Automation	
3:30 PM – 4:30 PM	Key Note Lecture on "Research Perspective and Challenges in EV Design and It's Charging infrastructure" by Dr. V. Karthikeyan NIT, Calicut, Kerala	CLICK HERE TO JOIN!
4.30 PM - 4.40 PM	Break	
4.40 PM - 5.40 PM	Session-3 Track -3A: Renewable Energy Sources Track- 3B: Smart Grid Technologies Track -3C: Power Electronics Control of Electrical Drives Track- 3D: Control and Automation	

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Day 2 ***April 20th 2021 (Tuesday)***

Time	Event	Venue
9.30 AM - 10.30 AM	Key Note Lecture on "Integrated Distributed Generation-Economic Dispatch for Cost Control in Power Systems" by Prof. Ir. Dr. Ismail Musirin, Universiti Teknologi MARA ,Malaysia	CLICK HERE TO JOIN!
10.30 AM - 10.40 AM	Break	
10.40 AM - 11.50 AM	Session-4 Track -4A: Renewable Energy Sources Track- 4B: Smart Grid Technologies Track -4C: Power Electronics Control of Electrical Drives Track- 4D: Control and Automation	
11:50 AM – 12:00 PM	Break	
12:00 PM – 1:00 PM	Key Note Lecture on " Smart Grid and Variable Renewable Energy Integration" by Prof. Dr. Jai Govind Singh, AIT Thailand	CLICK HERE TO JOIN!
1.00 PM - 1.40 PM	Lunch Break	
1:40 PM – 2:50 PM	Session-5 Track -5A: Renewable Energy Sources Track- 5B: Smart Grid Technologies Track -5C: Power Electronics Control of Electrical Drives Track- 5D: Control and Automation	
2:50 PM – 3:00 PM	Break	
3:00 PM – 4:00 PM	Key Note Lecture on "Design and Applications of Non-PM High Torque Density Electrical Machine" by Dr. Udochukwu B. Akuru, Tshwane University of Technology, SA	CLICK HERE TO JOIN!
4:00 PM – 4:40 PM	Session-6 Track -6A: Renewable Energy Sources Track- 6B: Smart Grid Technologies Track -6C: Power Electronics Control of Electrical Drives Track- 6D: Control and Automation	
4:40 PM – 5:30 PM	Key note Lecture on "Solar PV Power Forecasting for Smart Grid Energy Management" by Dr. M. Rizwan, Delhi Technological University , New Delhi	CLICK HERE TO JOIN!
5:30 PM – 6:00 PM	Valedictory	CLICK HERE TO JOIN!

Dr. A Pandian
Convener-ICSGSM 2021

Two Day International Conference on Smart Grids, Structures and Materials

(ICSGSM2021)

19th & 20th April 2021

Organized by

Department of Electrical and Electronics Engineering

19th April 2021 (Monday) Inauguration Program

10.30AM -11.30AM

Inauguration Program Schedule:

Time	Activity
10.30 AM - 10.32 AM	Welcome Address by Dr. S V N L Lalitha
10.32 AM - 10.37 AM	Lighting the Lamp & Prayer Song
10.37 AM - 10.45 AM	ICSGSM 2021- Report by Convener Dr. A Pandian
10.45 AM - 10.50 AM	Addressing by Head of Department Dr. J Somlal
10.50 AM - 10.55 AM	Addressing by Principal-K L CoE Dr. K Subba Rao
10.55 AM - 11.00 AM	Addressing by Registrar-KLEF, Dr. Y V S S S V Prasada Rao
11.00 AM - 11.02 AM	Introduction of Chief Guest Dr. D P Kothari by Mrs. G Swapna
11.02 AM - 11.15 AM	Addressing by Chief Guest Dr. D P Kothari
11.15 AM - 11.17 AM	Introduction of Special Guest Dr. Celia Shahnaz by Mrs. G Swapna
11.17 AM - 11.30 AM	Addressing by Special Guest Dr. Celia Shahnaz
11:30 AM – 11:35 AM	Vote of Thanks by Co-Convener Dr. P Srinivasa Varma

ICSGSM2021

Two Day International Conference on Smart Grids, Structures and Materials
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Department of Electrical and Electronics Engineering

20th April 2021 (Tuesday) - Valedictory Program Schedule

5.00PM -5.50PM

Valedictory Program Schedule:

Time	Activity
05.00 PM - 05.04 PM	Welcoming Delegates and Authors and Conference attendees by Mr. R B R Prakash, Coordinator-ICSGSM2021
05.04 PM - 05.11 PM	Conference Conclusion Remarks by Co-Convener Dr. P Srinivasa Varma
05.11 PM - 05.15 PM	Addressing by Head of Department, EEE Dr. J Somlal
05.15 PM - 05.20 PM	Addressing by Dean-R&D, KLEF Dr. B Jayakumar Singh
05.20 PM - 05.25 PM	Addressing by Dean-Academics, KLEF Dr. V R Raghuveer
05.25 PM - 05.30 PM	Addressing by Dean Skill Development and Principal-Academic Staff College, KLEF Dr. A Srinath
05.30 PM - 05.35 PM	Addressing by Chief Guest Dr. M. Rizwan, DTU , New Delhi
05.35 PM - 05.40 PM	Best Papers Announcement by Convener Dr. A Pandian
05.40 PM - 05.45 PM	Feedback from Authors and Conference Attendees
05.45 PM - 05.50 PM	Vote of Thanks by Mr. T Vijay Muni, Coordinator-ICSGSM2021 followed by National Anthem

To join in Virtual Valedictory Program click on

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Technical Schedule

Session 1

19th April 2021 11.45 AM to 1.00 PM

Track-1A Renewable Energy Sources	Track- 1B Smart Grid Technologies	Track- 1C Power Electronics Control of Electrical Drives	Track- 1D Control and Automation
CLICK HERE TO JOIN	CLICK HERE TO JOIN	CLICK HERE TO JOIN	CLICK HERE TO JOIN
ICSGSM2021-001	ICSGSM2021-085	ICSGSM2021-082	ICSGSM2021-095
ICSGSM2021-061	ICSGSM2021-089	ICSGSM2021-096	ICSGSM2021-101
ICSGSM2021-110	ICSGSM2021-091	ICSGSM2021-097	ICSGSM2021-102
ICSGSM2021-122	ICSGSM2021-092	ICSGSM2021-098	ICSGSM2021-103

Session 2

19th April 2021 2.35 PM to 3.30 PM

Track-2A Renewable Energy Sources	Track- 2B Smart Grid Technologies	Track- 2C Power Electronics Control of Electrical Drives	Track- 2D Control and Automation
CLICK HERE TO JOIN	CLICK HERE TO JOIN	CLICK HERE TO JOIN	CLICK HERE TO JOIN
ICSGSM2021-034	ICSGSM2021-055	ICSGSM2021-024	ICSGSM2021-009
ICSGSM2021-083	ICSGSM2021-088	ICSGSM2021-035	ICSGSM2021-079
ICSGSM2021-107	ICSGSM2021-111	ICSGSM2021-064	ICSGSM2021-104
ICSGSM2021-109	ICSGSM2021-113	ICSGSM2021-105	ICSGSM2021-112

Session 3

19th April 2021 4.40 PM to 5.40 PM

Track-3A Renewable Energy Sources	Track- 3B Smart Grid Technologies	Track- 3C Power Electronics Control of Electrical Drives	Track- 3D Control and Automation
CLICK HERE TO JOIN	CLICK HERE TO JOIN	CLICK HERE TO JOIN	CLICK HERE TO JOIN
ICSGSM2021-003	ICSGSM2021-010	ICSGSM2021-007	ICSGSM2021-106
ICSGSM2021-004	ICSGSM2021-011	ICSGSM2021-013	ICSGSM2021-014
ICSGSM2021-074	ICSGSM2021-012	ICSGSM2021-081	ICSGSM2021-016
ICSGSM2021-126	ICSGSM2021-093	ICSGSM2021-099	ICSGSM2021-115

Dr. A Pandian
Convener-ICSGSM 2021

TITLES AND ABSTRACTS

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Department of Electrical and Electronics Engineering

Table of Content

S. No.	Paper ID	Title of the paper	Name of the Author(s)
1	ICSGSM2021-003	Enhanced Low Voltage Panel Switchgear Power System Design by Selecting Air Circuit Breakers (ACB) As a Function of Temperature	Dinakar Yeddu
2	ICSGSM2021-004	Suppression of Electromagnetic noise using EBG structure	Y.Uma Maheswari
3	ICSGSM2021-006	Reliability Improvement in Distribution System Using Plug in Electric Vehicle	Settipall iNeelima G. Swapna
4	ICSGSM2021-007	A Comparative Study on Different types of Drive Train Systems of Hybrid and Plug in Hybrid Electric Vehicle	Siriyala Trilochana
5	ICSGSM2021-009	On Road Electric Vehicle Mobile ByDyamic Wireless Power Station	Sasindhiran P
6	ICSGSM2021-010	SAR Analysis of Body wearable Frequency Reconfigurable Textile Patch Antenna	B. T. P. Madhav
7	ICSGSM2021-011	Effects of Human Sweat on the Performance of Reconfigurable Frequency Wearable Jute Textile Antenna	B. T. P. Madhav
8	ICSGSM2021-012	Design and Analysis of Optimized Dimensional MIMO Antenna Using Sequential Non-Linear Programming Algorithm	B. T. P. Madhav
9	ICSGSM2021-013	Enhancement of Power Quality Using Conservative Power Theory with Islanded Micro Grid Based Fuzzy Logic Controller	Dharani
10	ICSGSM2021-015	Optimal Placement and Sizing of DG for loss minimization using ABC Optimization	K.HarshaBala Vardhan K. Sarada
11	ICSGSM2021-016	Design of Intermittent flash reactor forlarge scale synthesis of turbostratic graphene using bottom-up technique	Rayasam Sourabh
12	ICSGSM2021-017	Hybrid and Solid-State Transformers for Power Quality Enhancements in Distribution grid-comparison to voltage Regulation Distribution Transformer	Dinakar Yeddu
13	ICSGSM2021-020	Bat and Grasshopper algorithms based MPPT for Grid-connected photovoltaic system	M. Ramesh Kumar
14	ICSGSM2021-027	Hybrid ALO-CS based MPPT for Grid-connected Photovoltaic System	T. Krishna Mohan
15	ICSGSM2021-031	A Study on Identification of Critical Transmission Line	T. Somalaxmi Madhuri

16	ICSGSM2021-034	Starting method of BLDC motor without position Sensors	C. Jaya Deepak T. Teja Sreenu
17	ICSGSM2021-035	Design and Analysis of Phase Shifted Current-Fed Isolated Soft Switched DC-DC Converter for High Gain Applications	Vepe Satya Sai Narsimha Varma S. Ravi Teja
18	ICSGSM2021-037	A Critical Study and Investigation With Respect to Similarity on Software Applications	N. Niharika
19	ICSGSM2021-043	A High Efficient on-Board Battery Charger for Electric Vehicles	R. Lokesh Dr. B. Jyothi
20	ICSGSM2021-044	Analysis of Electrical Characteristics of the Three-Phase Transformer Using Finite Element Method	A. Sharon Daphne
21	ICSGSM2021-049	Cascaded H-Bridge Based Shunt Hybrid Active Power Filter	K. Sumanth Dr. J. Somlal
22	ICSGSM2021-054	A Machine Learning Scheme to Identify Coherency of Generators in Power Systems	Hari Srinivasa Prasad Muppalla Dr. M. Naga Chaitanya
23	ICSGSM2021-055	ESP8266 and Arduino based Patient health monitoring System	S Nagendram
24	ICSGSM2021-061	Solar Powered In-Situ IoT Monitoring for EV Battery Charging Mechanism	Vobhilineni Sai Praveen Dr. B. Jyothi
25	ICSGSM2021-062	A Hybrid Energy Generation System	N. Suseel Kumar Dr. M. Kiran Kumar
26	ICSGSM2021-064	Experimental Determination of State of Charge of Li-ion Battery	M. Govardhan Dr. K. Narasimha Raju
27	ICSGSM2021-067	A Novel Unified Power-Quality Conditioning System on Line Loading, Losses, and Voltage Stability of Smart Buildings	V. Anantha Lakshmi
28	ICSGSM2021-073	Investigation of Properties of Short-Term Aged Liquid Dielectrics	B. Mahalakshmi
29	ICSGSM2021-074	IOT Based Bi-Directional Meter	S. Lokesh Babu
30	ICSGSM2021-079	Comparison of surface pollution flashover characteristics of RTV Coated Insulators Under Different Damage Modes	M. Shinegha
31	ICSGSM2021-080	Prediction And Analysis Of Transformer Oil Using Fuzzy Logic Algorithm	M. Rajalakshmi
32	ICSGSM2021-081	Grid Interactive Solar PV Based Water Pumping Using NPC-MLI fed BLDC Motor Drive	A. Lalitha syamala
33	ICSGSM2021-082	Power Quality Improvement with Hysteresis Current Controller Based Active Power in Synchronous Generator	T Vijay Muni
34	ICSGSM2021-083	Closed Loop Control of Bi-Directional Converter with Soft Switching	Pandala Rathnakar Kumar
35	ICSGSM2021-085	Power Quality Improvement Using VLLMS based on Adaptive Shunt Active Filter	B Manoj Koushik T. Vijay Muni
36	ICSGSM2021-089	Design Construction and Performance Evaluation of Aluminum Ion Battery	K Raja Ranganath D. Seshi Reddy

37	ICSGSM2021-091	Solar PV-Powered BLDC Drive for EVs to achieve Flexible Energy Control Functions using Tri-port converter	Bhavana pagadala T. Teja Sreenu
38	ICSGSM2021-092	Design and Implementation of Image Processing Based Fire Fighting Robot	Tubati Kishore Dr. J. Somlal
39	ICSGSM2021-093	Fuzzy Controller Based Solar PV Fed SRM Drive For Pumping Application	Venkata Mahesh Babu Lella
40	ICSGSM2021-094	A New Topology of SPV fed Closed Loop DC-DC Converter for BLDC Motor for Water Pumping System	T Vijay Muni
41	ICSGSM2021-095	Fuzzy Logic Control of a Three Phase Four-Wire Four Leg APF	Bellapukonda Sravani
42	ICSGSM2021-096	Rechargerable Aqueous Aluminum Ion Battery	M Vidya Krishna Sharma D. Seshi Reddy
43	ICSGSM2021-097	Improving Reliability of Distribution System using Demand Response	P Vishnu Sai Sree D. Sudha
44	ICSGSM2021-098	Microcontrolled Based Cell Balancing Of Dead Batteries	A. Sandeep Dr. M. Kiran Kumar
45	ICSGSM2021-099	Optimal Allocation of FACTS devices in the transmission System using Teaching Learning Based Optimization Algorithm	K Sravani Priya Dr. P. Srinivasa Varma
46	ICSGSM2021-100	An EV Charging System Using an SMES Implanted Smart Grid	D.SHAROOQ Dr. P. Srinivasa Varma
47	ICSGSM2021-101	MPPT Algorithms for Sudden Changes in Irradiance and Temperature at a Time	S. Rajasekhar
48	ICSGSM2021-102	Mitigation Of Current Harmonics In Power System Using Fuzzy Based Shunt Apf Controller	B Mohan Sai S. Raja Sekhar
49	ICSGSM2021-103	Design Of Hybrid System Using PV Module &Fuel cell for a Standalone Load	Ch. Manasa G. Swapna
50	ICSGSM2021-104	Impact of EV's to improve the reliability of IEEE 14 bus System	Md Ayan G. Swapna
51	ICSGSM2021-106	Grid Filter Design Evalvation for 5-Level and 7-Level Voltage Source Inverters	Udaya kumar Nalla Dr. A. Pandian
52	ICSGSM2021-107	A Sensor To Detect The Fuel Theft At Filling Station	P.Sai Pavan Kiran Dr. K. Narasimha Raju
53	ICSGSM2021-108	Techno-economic Analysis of Renewable Energy based Hybrid System for common facilities of Remote Locations in India	Bandana
54	ICSGSM2021-109	Path Controlled Self-Balanced Robot For UV Sanitization Application	R Sai Rohan Reddy Kalyan Dusarlapudi
55	ICSGSM2021-110	Power Source Scheduling and Control of Solar PV Assisted Electric Vechicle Charging Station	S. Ravi Teja
56	ICSGSM2021-111	Fuzzy Logic based Simplified Approach for Short Term Load Forecasting	Arshi Khan
57	ICSGSM2021-113	Solar Energy Forecasting using Fuzzy Logic and Artificial Neural Network	Md Tabish Ansari
58	ICSGSM2021-114	Efficient Control and Battery Pack Optimization for PV Assisted Electric Vehicle Charging Infrastructure	S Ravi Teja

59	ICSGSM2021-115	An Efficient Vedic Based Processing Element for Systolic Array	Sekar R
60	ICSGSM2021-116	An Efficient Vedic based Squaring Circuit for Data communication	Sekar R
61	ICSGSM2021-117	PREDICTION OF COVID19 SERIES PATTERN	Sekar R
62	ICSGSM2021-119	Power Quality Improvement Using Shunt Active Power Filter With p-q & d-q Current Control Strategy	K. Sarada
63	ICSGSM2021-120	CSRR Based Compact MIMO Antenna for UWB Applications	S Nagendrum
64	ICSGSM2021-121	Embedded Remote Condition Monitoring System for Industrial Machinery	Saravana kumar Gurusamy
65	ICSGSM2021-122	Implementation Of Solar And Wind Energy In Domestic Household	Parvathaneni Gunadeep
66	ICSGSM2021-124	Pressure, Humidity & Temperature Measuring System using Raspberry Pi in Satellite Communication	S Nagendram
67	ICSGSM2021-125	IOT based WPT powered Automatic Sanitise Dispenser	Charan Sai Tiruvuri
68	ICSGSM2021-127	Object Detection In A Video Footage	A.Siva Sai Kiran
69	ICSGSM2021-128	State Estimation by Phasor Measurements in Power System for IEEE-14 BUS SYSTEM	Ankit Kumar Dhaikar
70	ICSGSM2021-130	Analysis of PQ, SRF and Id – Iq Control strategies for Power Quality Improvement in Power Distribution System	Kasim Valli
71	ICSGSM2021-131	Design of Tuning Fork Gyroscope Based on MEMS	G R K Prasad
72	ICSGSM2021-134	An Investigation of a Frequency Reconfigurable Circu-lar Polarized Textile Antenna Bending Effects for On-Body Communication applications	B. T. P. Madhav
73	ICSGSM2021-135	A Novel Knowledge Based Classification Algorithm ForSatillite Images	Tata Ravi Kumar
74	ICSGSM2021-136	An Approach To Rational Resource Distribution In Cloud Computing Environments	Tata Ravi Kumar
75	ICSGSM2021-137	Fuzzy Controller ForDfig Based Wind Farm For Improving The Stability Characteristics In A Microgrid	R B R Prakash
76	ICSGSM2021-001	Reliability Evaluation of Power Electronic Inverter using Cutset Approach	Palthur Shashavali V. Sankar
77	ICSGSM2021-014	Enhancement Of Power Quality In Multilevel Inverter Using A Hybrid Controller	Y.LalithaKameswari Dr.D.Sudha Rani
78	ICSGSM2021-018	Analysis for Switched Reluctance Motor Converter for Electric Vehicle Application	Anuradha Devi Tellapati Malligunta Kiran Kumar
79	ICSGSM2021-088	Control Strategy of Shunt Active Power Filter for ANN Based Non-Conventional Energy System When Integrated to Grid	Mr. K. V. Govardhan RaoDr. Malligunta Kiran Kumar
80	ICSGSM2021-105	High Efficiency Active Cell Balancing for Battery Stack Performance Enhancement in PV-Wind Hybrid Energy	V Lakshmi Narayana M Kiran Kumar S Ravi Teja

		System and Ultra-Light electrical Vehicles	
81	ICSGSM2021-106	SST Based Medium Voltage Extreme Fast Charger for Electric Vehicles using Fuzzy-PI and ANN Controllers	Sai Lakshmi Arigela A. Pandian
82	ICSGSM2021-118	Advanced Machine Learning Techniques for State of Charge Estimation in Electric Vehicles	Trinadh Thota K. Narasimha Raju
83	ICSGSM2021-123	Novel Programmable Solar Based SIMO Converter for SMPS Applications with IOT Infrastructure	Sumanjali Chundu Kalyan Dusarlapudi NarasimhaRaju. K
84	ICSGSM2021-126	Variable Frequency Drive Optimization with Adaptive Neuro-Fuzzy Inference System	Rekha Mudundi Malligunta Kiran Kumar
85	ICSGSM2021-132	An Optimized Control Structure for Load Sharing in Autonomous HRES Microgrid System using ANFIS Controller	Kiran Gottumukkala, B. Loveswara Rao
86	ICSGSM2021-137	Fuzzy Controller For DFIG Based Wind Farm For Improving The Stability Characteristics In A Microgrid	K Sameeksha S Sai Vara Prasad R B R Prakash
87	ICSGSM2021-138	Impact of Energy Storage Device on the Performance of Distributed Generation in Maintaining the Constant Power Flow to Grid	Tati Narendra, Kommuri Parvesh, R B R Prakash

Enhanced Low Voltage Panel Switchgear Power System Design by Selecting Air Circuit Breakers (ACB) As a Function of Temperature

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Abstract. Low voltage switchgear power system is used to distribute supply to load. Development is enormous, best switchgear power systems are available from the suppliers. In the site where it is installed overheating is happening that is temperature crossing the limits because of this effect electrical components will damage, shut down of the switchgear for maintenance or repairs leading to the power cut. This will have an impact on loads where needed 100 percent reliability of supply required, examples are factories, airports, hospitals etc. This paper discusses an enhanced low voltage switchgear power system design by selecting air circuit breakers as a function of temperature. Previously circuit breakers considered based on load ratings. Now the temperature effect is considered in my paper leading to breaker selection not only on load but also temperature factor. This minimizes the downtime, increase reliability and life and helps the designers and maintenance directors.[1]

Keywords: Derating Factors, Air circuit breaker, Switchgear

Suppression of Electromagnetic noise using EBG structure

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Abstract. It is inevitable to consider the electromagnetic interference in recent electronic products as it deals with high-speed signals and match with the product standard. In this paper, electromagnetic band gap structure is designed which can be deployed as one of the layer of high speed printed circuit board for mitigating the electromagnetic noise and it is simulated in ADS simulator tool and measured the electromagnetic noise. Usage of this band gap structure reduces the noise level up to 60 dB in the greater frequency range 0 GHz – 25 GHz. The same is compared with continuous plane structure and the results are analysed.

Keywords: Electromagnetic Band Gap, Electromagnetic noise, Printed Circuit Boards (PCBs), Switching noise.

Reliability Improvement in Distribution System using Plug in Electric Vehicle

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Abstract: The electric utility industry is moving toward a more accessible, serious environment in which utilities need detailed data on system execution to ensure that maintenance money is spent wisely and that consumer expectations are met. Consistent blackouts and breaks in the electrical components of the distribution network have a negative effect on system health, stability, and reliability, as well as a low level of output in the mechanical sector. Every utility must develop a reliability Improvement Strategy based on their requirements. These days, utilities hope to find methods for improving the unwavering efficiency of

dispersion frameworks and satisfying consumers by ensuring force supply continuity. In this project, careful charging/releasing of module electric vehicles (PEVs) is examined for improving the reliability of a dissemination process by obtaining rational unwavering process improvement methods via study in the simulation environment "MATLAB" and hardware implementation via a micro-controlled based device. Such research is encouraged by the positive outcomes of plug-in electric vehicles (PEVs) in addressing global issues such as petroleum product shortages, urban air pollution, and ozone-harming material emissions. PEVs are used in this way to improve reliability and investigate the characteristics of appropriation organisations.

Keywords: Plug in Electric Vehicle (PEV's), Distribution network, Reliability, Reliability Improvement.

A Comparative Study on Different types of Drive Train Systems of Hybrid and Plug in Hybrid Electric Vehicle

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Abstract: The other alternative to IC engine vehicles in the market is electric vehicle, but the use of electric vehicle is not a lot because of the rare availability of charging stations. Therefore, there is a lot of research going on hybrid electric vehicles design wise, in optimal power control system in design aspects and battery rechargeable capacity while driving. This paper gives point by point data about different configuration of drive systems exists and novel drive techniques in hybrid electric vehicle (combination of two different sources to drive the vehicle, HEV) and plug in hybrid electric vehicle (where we can charge the batteries of electric source of vehicle externally, PHEV) by comparing their efficiency, battery rechargeable capacity, complexity of design, benefits of drive wheels rear wheel drive(RWD), front wheel drive (FWD).

Keywords: Hybrid Electric Vehicle (HEV), PHEV, RWD, and FWD.

On Road Electric Vehicle Mobile by Dynamic Wireless Power Station

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Abstract. In Wireless power transfer (WPT) systems transfer of source in form of energy to the load of electric vehicle (EV) without any wired connection is an ongoing process which is used under many applications is differentiated to the wired counterpart, with no exposing of wires from the vehicle, with ease charging, and fearless transmission of power in all environmental conditions. In the automobile industry the eco-friendly vehicles play an immersive role in global trends where the adoption of WPT to charge the batteries in a vehicle has been an effort made for the development of various topologies. Due to the commercialization of the EV is increased with short life time, with the need of larger capacity and weight, but there is always an urge for fast and wireless charging where the EV been as substitute for the petroleum vehicles. To make the EV more efficient, wireless charging of electric vehicle is introduced with an alternative of slow development of battery storage and charging station. The new technology is introduced based on wireless power transmission between the vehicle to vehicle that is on road mobile charging for electric vehicle so the time required for charging the battery is also reduced . In this paper is based on fast charging of vehicle, the transmitter coil is embedded with a on road vehicles rear end which is a grid here and receiver coil is embedded with a EVs front end. It also proposes the communication between the electric vehicle and to the grid vehicle for power transmission.

Keywords: Wireless Power Transfer(WPT), Battery, Power grid, Electric vehicle

SAR Analysis of Body Wearable Frequency Reconfigurable Textile Patch Antenna

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Abstract. This work validates the on-body performance evaluation of frequency reconfigurable circularly polarized textenna fabricated on jute material. This designed frequency reconfigurable antenna operates in four different configurations, and they are achieved by the successful operation of 2 pin diodes (BAR-64-03W) in the ground plane. In stand-alone conditions for each configuration, this antenna resonates at 2.4, 4.29, 5.78, and 9.39 in C1. 5, and 5.9 in the C2. 4.4, and 5.8 in C3, and finally 3.5, 4.4, 5.3 in C4. The circular polarization was achieved at 2.4, 3.5, 5.8, and 5.9 GHz, among the above-listed configurations, respectively. This reconfigurable antenna was intended to work in proximity of the human body, so SAR analysis was done to analyze the performance of the antenna on the body. A human body mimicking three-layer phantom model comprising muscle, fat, skin was developed in HFSS software. The antenna is validated by placing on it, and SAR was also performed. The fabricated jute antenna has shown an excellent characteristic even after placing it on the human body. A decent match has been noted between simulation and measurement results. Specific Absorption Rate (SAR) analysis on 1 gram of tissue shows the applicability of the reconfigurable textenna for on-body communication applications.

Keywords: Reconfigurable frequency textenna, three-layer phantom model, SAR analysis.

Effects of Human Sweat on the Performance of Reconfigurable Frequency Wearable Jute Textile Antenna

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Abstract. This work presents the performance evaluation of a frequency and polarization reconfigurable wearable antenna. The antenna's primary radiating element is of sickle shape, and a similar kind of structure is supported as the ground element. The antenna is fabricated on the jute felt material, and its conductivity is drawn by applying the conductive copper paint. Two BAR-64-03W pin diodes are smartly used in the ground plane to operate in four different configurations. In stand-alone conditions, the proposed antenna resonates at 2.4, 4.29, 5.78, and 9.39 in C1. 5, and 5.9 in the C2. 4.4, and 5.8 in C3, and finally 3.5, 4.4, 5.3 in C4 configurations. These reconfigurable textile antennas have a unique task in many strategic applications such as health monitoring, security, and safety. The proposed model is made with natural fiber material and is designed to operate on the human body in different conditions and absorbs sweat and dust. So, it experimentally investigated its operating performance in various swear conditions. An artificial sweat solution is considered for this performance evaluation. In all the experimental conditions, the antenna has worked with marginal variations, which admits the textenna's robust performance that is acquired by considering the natural jute fiber as a substrate and traditional brush painting mechanism.

Keywords: Artificial sweat solution, Reconfigurable frequency textile antenna, pin diodes, jute material.

Design Optimization of a multi-band MIMO antenna for UWB Characteristics using Sequential Non-Linear Programming Algorithm

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Abstract. The work represents a novel optimization procedure for converting a multi-band MIMO (Multi-Input and Multi-Output) antenna into an Ultra-Wide Band (UWB) MIMO antenna. The SNLP (Sequential Non-Linear Programming) algorithm of HFSS carried out the antenna's design optimization. To accomplish this, the MIMO antennas multiple-objective design task is now converted as an optimization task with a prime goal of an ultra-wideband operation by attaining isolation of 20 dB. The geometrical parameters of the proposed MIMO are successfully optimized by the SNLP algorithm of ANSYS HFSS. For validating the optimized parameters, a MIMO prototype antenna is built on a low-cost, commercially available FR-4 material. Moreover, the built prototype is authenticated in an anechoic chamber. A good alignment has been testified between the measurement and simulation curves by achieving UWB, isolation of 20 dB, and around 2dB in the resonating bands. The desired optimization is successfully attained by the SNLP algorithm. This proposed model is suitable to work in commercial band applications of the UWB, such as 3.6 GHz of WLAN (Wireless Local Area Network) and 5.3 GHz of Hyper LAN.

Keywords: MIMO antenna, SNLP, UWB band, optimization, coupling isolation.

Enhancement of Power Quality Using Conservative Power Theory with Islanded Micro Grid Based Fuzzy Logic Controller

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Abstract. Power quality (PQ) issues frequently sway non-direct loads. Framework reverberation, capacitor over-burdening, and a reduction in effectiveness are totally brought about by consonant flows. Voltage hangs are a typical event in electrical frameworks that cause power quality issues. In a microgrid, helpful administration of force converters improves power quality at responsive burden transports. Within the sight of receptive, nonlinear, and lopsided burdens, such participation is particularly fundamental. Control signs might be traded among inverters in a solitary gathering because of their nearness, conceivably taking into account fast burden sharing and the alleviation of unfortunate current segments. Every people group is exposed to administrative control to decide the most reasonable sharing components since every essential source has its own arrangement of limitations. In the abc-outline, the CPT deteriorations give decoupled current and force references, bringing about a specific control technique that can divide every current bit with an ideal rate between the microgrid inverters. The achievability of the proposed approach is exhibited utilizing reproduction results. Besides, the fluffy rationale regulator diminishes voltage list levels in the yield voltage and builds the force factor. The fluffy rationale regulator is utilized to develop the control circuit, which is then construct in MATLAB/SIMULINK.

Keywords: Active Power Filter (APF), Conservative Power Theory, Cooperative Regulation, Distribution Generation, Four-Leg Inverter Microgrid, Power Quality Improvement.

Optimal Placement and Sizing of DG for Loss Minimization using ABC Optimization

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Abstract. Distribution Generation (DG) units are related to small generation units and located to the load centers or at the load centers. Most of the DG's are developed by use of small renewable and clean generation techniques. Those are wind turbines, photovoltaic, fuel cells, micro-turbines and so on. Distribution System Planning (DSP) is one of the most favorable technique in all the important challenges and it foremost by the system planners. Previous analyses have been indicated that the inappropriate selection of DG's locations and sizes. It will direct to more system losses than the losses before connecting

DG. At present, utilities are facing the more power loss and less profile of voltage. It is done especially in developing countries and they cannot tolerate these losses increment. By optimum allocation of DG's, there will be reduction in system losses, improved in voltage regulation, also improvement in supply reliability in distribution system. In this project, analyze the reduction in yearly energy losses of the distribution system by DG's are placing in optimum location along with size or range. The following constraints are considered to limit the system losses: voltage limits at different buses of the distribution system, feeder capacity, less size of the DG unit, more utilization of each bus and more connection limit of the DG system. Because the solar and wind-power based generation is subjected to most unpredictability in all other DG techniques and also the load on each bus might not be at its peak all the time, these uncertainties are taken into account. A probabilistic approach is simulated in MATLAB to achieve the objective.

Keywords: Distributed Generation, Reactive Power, Optimization Techniques, Artificial Bee Colony, Voltage Regulation.

Design of Intermittent Flash Reactor for Large Scale Synthesis of Turbostratic Graphene Using Bottom-up Technique

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Abstract. An industrial scale method for synthesis of graphene is of the essence for commercializing the applications of graphene. Although various methods like ball milling, ion implantation, microwave assisted oxidation, intercalation, supersonic spraying, nanotube slicing, carbon dioxide reduction, electrochemical exfoliation, chemical vapor deposition and roll to roll CVD claim to manufacture graphene, only bottom-up techniques give pristine quality graphene. In general bottom-up methods produce graphene in ultra-small quantities and are very expensive which is not suitable for applications. In this paper we report a scalable route for one such bottom-up technique called flash joule heating process. Flash joule heating Process can produce high-quality low-cost graphene unlike other bottom-up process like chemical vapour deposition, but its production quantity is still limited to milligrams, flash joule heating can turn almost any carbon source such as coal, biochar, carbon black, petroleum coke, food waste, rubber from tyres and mixed plastic waste to graphene in a fraction of second. Whereas its applications demand graphene in kilograms and tonnes. We have developed an intermittent flash reactor which is an automated machine using two-skewed shaft intermittent mechanism to iterate flash joule heating process to produce turbostratic graphene in kilogram scale. Thus, formed graphene can be used in wide range of applications like an additive to strengthen composites such as concrete, reinforced plastics, plywood, rubber and other building materials. This method utilizes very small amount of energy per iteration that is 7.2KJ making it cost effective for industrial scale. The reactor consists of a simple assembly of rotating skewed shaft connected to a gear which intern connected to an electrode wheel, the periphery of the wheel consists of multiple number of thin walled quartz tubes which carry around a gram of carbon source in each of them. A reciprocating electrode slightly compresses the carbon material and high voltage is applied across the electrodes. This converts the carbon source into graphene. Therefore, low cost and high productivity makes this method viable for large scale synthesis of graphene.

Keywords: Graphene, Turbostratic graphene, Flash joule heating.

Hybrid and Solid State Transformers for Power Quality Enhancements in Distribution grid-comparison to voltage Regulation Distribution Transformer

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Abstract. The awareness of the limited availability of fossil fuels and of their negative impact on the global environment is increasing. A transition towards a sustainable energy generation from renewable sources is of paramount importance, but challenges the operation of the distribution grid. The distributed generation results in undesirable voltage fluctuations in distribution grids,In the future grid, more controllable properties are planned. Active, reactive power and voltage control was dynamically controlled

by solid state and hybrid transformers.The functionality and efficiency of hybrid and solid state transformers with voltage regulation ,distribution transformers was compared in this article.

Keywords: Hybrid transformer (HT), Low frequency transformer (LFT),solid state transformers(SST),power quality .

Bat and Grasshopper MPPT for Grid-connected Photovoltaic System

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Abstract: A new idea of Bat and Grasshopper algorithms improves efficiency and provides a better balance in energy supply. The power system becomes more complicated in design because the new type of renewable system is added to the grid. To achieve the maximum power from the photovoltaic panel when connected to the grid, this study proposes a hybrid algorithm for providing maximum power from solar to the grid by tuning the duty cycle. A BAT and Grasshopper optimization techniques are implemented to obtain optimal value of the duty cycle required for boost converter. The results show that the proposed algorithms provide better execution in the tuning of the duty cycle compared with the other optimization technique with a low level of total harmonic distortion. It is considered under uniform irradiance conditions and fixed temperature.

Keywords—BAT algorithm, Grasshopper algorithm, MPPT, PV array

HYBRID CS-ALO MPPT FOR GRID-CONNECTED PHOTOVOLTAIC SYSTEM

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Abstract: This paper proposes an optimization-based MPPT for a grid-connected photovoltaic (PV) system that constitutes a solar array, a boost converter, and a voltage source converter. It is required to track the maximum power of the PV array hence, an optimization algorithms have conjoined in a boost converter and Voltage Source Converter (VSC) to fulfill this purpose. AntLion Optimization (ALO), Cuckoo Search (CS) and hybrid combination of CS-ALO chosen as MPPT techniques. The boost converter's output voltage is regulated and synchronized with 200 kW power to the grid. The three-phase VSC is associated to boost converter through the filter circuit. This proposed system is to be tested and verified in Matlab/Simulink Environment. The output of the filter circuit produced current which is supplied to the grid. The main intention of this paper is to reduce the total harmonic distortion (THD).

Keywords—ALO algorithm, CS algorithm, MPPT, PV array and ALO-CS Hybrid Algorithm

A Study on Identification of Critical Transmission Lines

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Abstract: Growing load demand and increased demand for electric power pose great challenges to the components of the power system. Continuous overloading of the power system can cause an increase of the transformer temperature thereby failure, tripping of lines, etc. The exact identification of critical lines will protect the system. Various parameters affect the transmission line failure they are environment failures, insulation problems power, voltage, and current flow.

In this paper Real power loss index (RPLI), Voltage stability index (VSI) with help of the Newton-Raphson method and rank correlation concept, the critical transmission line is identified. This study is conducted on the IEEE6 bus system using MATLAB software.

Keywords: Critical Transmission line, blackout, RPLI (Real Power Loss Index), VSI (Voltage Stability Index), Spearman's rank correlation coefficient.

Starting of BLDC Motor without Position Sensors

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Abstract. This paper discusses about finding of initial rotor position when motor is not yet started or motor is stand still. The main or key point of finding initial rotor position is by simple detection and voltage comparison of each phase & responses of current which is related with the stator inductance variation. In the proposed method 3 voltages-pulse are injected and we achieved a resolution of 30°.The method effectives is verified by using simulation. In extension of this we derived an equation for initial rotor position, which depends on the currents of each phase.

Keywords: Brushless dc (BLDC), voltage-pulse injection, initial rotor position.

Design and Analysis of Phase Shifted Current-Fed Isolated Soft Switched DC-DC Converter for High Gain Applications

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Abstract. The use of renewable energy sources has increased significantly in recent decades due to exponentially rising global energy demand and reduced supply of fossil fuels due to rapid depletion. Solar is proving to be one of the most promising options for meeting the growing global energy demand and supply gap. The PV cells output is limited to low voltage. The use of a front end DC-DC converter as a front end converter for interfacing PV power grid to the grid is efficient for interfacing renewable sources to the grid. Compared to voltage-fed converters, the mentioned converter has a number of advantages.

Keywords: Zero current switching, Current-fed DC-DC converter.

A Critical Study and Investigation with Respect to Similarity on Software Applications

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Abstract: Many software has similar functionality and they do have differences compared to other. To look over the similarities and differences we use Analysis to compare them. It is very difficult and complicated task to find similarity between different software as there are many features or metrics that should be considered. We can find similarity between software using different input data like source code, online software description, software building process, using their binary files, using software API references, using their repository actions and etc.,. We cannot say one information is better than other as every information has its own importance. So, we can choose any inputting method. In our project we have used online description of

software to calculate the similarity as it is difficult to get source code or building process of software. After selecting input data, we have to use certain method to calculate similarity value. There are various/different techniques like using KNN model, SVM model, Decision tree, and some NLP methods such as LDA, TF-IDF, cosine similarity, Word embedding, etc.,. In our project we have used two methodologies to calculate to what extent software are similar. These methodologies will be illustrated in further chapters. There are many situations and areas in which we will calculate similarity between software such as to detect plagiarism between software, in product testing line, to increase effectiveness of product, to get similar applications while searching and so on. These are some areas in which calculating software similarity can be used.

Key Words: Semantic similarity, Similarity analysis, Software, Software similarity, Syntactical similarity.

A High Efficient On Board Battery Charger for Electric Vehicles

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Abstract. In electric vehicles (EV) battery is treated as a principle power source. along these lines, investigation of battery charger is significant. Group of people yet to come of vehicles practically all are electric vehicles. On electric vehicle charging stations charger assumes a crucial part. Various EVs has diverse force appraisals. In view of the charging levels to charge EVs. Level 1 is home charging(120V) ,it just requires a grounded 120V level 1 charger is appropriate for low and medium reach 1 plug in EVs. Level 2 is home and public charging(240V) ,it requires not many hours to charge the battery. Level 3 is a DC quick charging (480V),it charges a vehicles 80% charge inside 30 minutes. In this task, PI regulator is planned dependent on the prerequisites and with the assistance of full extension DC converter is utilized to get a 2 high proficient on board charger. In view of the appraisals of battery the EVs going to be charged. A Battery charging framework is broke down which incorporates a non secluded on-board charger, a non-disconnected DC converter is utilized to improve proficiency of the electric vehicle. On that charger, to set required appraisals like 3 force rating, current rating, voltage rating, etc and furthermore keeping up the recurrence. The proposed converter is to recreate PSIM climate and results are check by manufacturing model on board charger for EVs.

Keywords: DC-DC converters, BUCK converter, On-Board battery Charger(OBC), Electric Vehicles , PI controller , Phase-shifted , Soft Switching, JK flip flop, SR flip flop, mono-stable multi-vibrator.

Analysis of Electrical Characteristics of the Three-phase Transformer using Finite Element Method

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Abstract. The most important equipment in an electrical power network is transformer, which plays a core role in voltage transformation, power transmission, and distribution.The transformer's fundamental theory having held steady for over a century, though architecture consistency remains critical. So that a very powerful tool, called the method of Finite Element Analysis (FEM) is used to analyze and design the transformer. FEM is used for modeling the electric field strength and potential and identifying the specification on a real transformer. It provides clear geometry modeling and output waveform. The finite Element Method is a highly effective tool for measuring various transformer parameters.Mostly with specifications from either the transformer, 2D and 3D versions of a three-phase transformer being modelled by using Finite Element Analysis approach in this suggested protocol. It is used for easier modeling of complex geometry and can solve for a high degree of accuracy. By using this simulation model, electrical characteristics like the induced voltage, primary and secondary current, core loss, magnetic flux, flux distribution are studied to verify the performanceof the transformer in the simulation

model.

Keywords: Transformer; Transformer failure; ANSYS; Transformer losses.

Cascaded H-Bridge Based Shunt Hybrid Active Power Filter

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Abstract. Ongoing deregulation in electric power industry has resulted in considerable research interest in the area of power quality improvement. The significant application of power electronics devices in the modern electrical power distribution system is increasing day by day. The nonlinear characteristics of these loads make them to drawn on-sinusoidal current from the mains and degrading the power quality by causing harmonic distortion. This paper reports an investigation of harmonic and reactive power related aspects of power quality improvement, using a Shunt Hybrid Active Power Filter (SHAPF) which is a shunt compensator. SHAPF is the combination of shunt Passive Power Filter (PPF) and shunt Active Power Filter (APF). The shunt PPF is used for attenuating dominant harmonic component while shunt APF compensates for multiple harmonic components and power factor control. Cascaded H-bridge is used in active power filter. As the name implies, this multilevel inverter produces inverted AC from separate DC sources by connecting full H-Bridges in series. Any natural resource, such as sunlight or wind energy, can be used as DC sources. It clamps without the use of capacitors or diodes. Synchronous reference frame theory (id-iq) that can be used to trigger the inverter based on the harmonical or fault current, so D-Q theory is used for commutation in this project. This entire project is aimed at lowering the grid's harmonic content.

Keywords: Cascaded H type multilevel inverter, Shunt hybrid active power filter, Power quality, Total harmonic distortion, Non linear loads.

A Machine Learning Scheme to Identify Coherency of Generators in Power Systems

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Abstract. The managed islanding scheme is a last resort for keeping the transmission system operational during cascading event outages that could result in a major blackout. It divides the network into stable and unstable islands, reducing the spread of uncertainty. To introduce supervised islanding, we must first identify the system's coherent classes.The RMS value of the equivalent machine model's relative angular difference built across all generator buses from local measurements is used to describe generator coherency in this paper. They are processed by k-means clustering after calculating the RMS value, classify the stable and unstable generators. The proposed methodology's efficiency will be tested using the IEEE 39 bus benchmark. The results of the simulation are then compared to approaches that have recently been published in the literature.

Keywords: Cascaded tripping, special protection systems, generator coherency identification, and controlled islanding.

ESP8266 and Arduino based Patient health monitoring System

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Abstract. Health has become one of humanity's most pressing issues. Cardiac issues, lung failure and other disorders related to heart are on the rise. Tracking the wellbeing of elder people at home or patients at hospitals is important, but clinicians and doctors must do so on a regular basis. Information technology and its ever-expanding application make people's lives simpler. The Internet of Things, as well as the role of healthcare technology, is transforming .IoT connects physical devices to the internet, such as patient monitors and tracking systems, and sends data from the physical to the digital realm. This paper demonstrates a method that employs the Internet of Things to track a patients' body 24/7. Researchers and medical parents are increasingly involved in patient management programs these days. Every 15 seconds, this device can detect physiological parameters from patient's body. This device uses a WIFI-Module to transmit patient's pulse, body temperature and heart rate to an IoT Cloud platform, where the patient's health status is stored. It enables a medical practitioner or another approved individual to keep track of a patient's health.

Keywords: WIFI-Module, IoT Cloud, IoT.

Solar Powered In-Situ IoT Monitoring for EV Battery Charging Mechanism

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Abstract. Our reliance on petroleum products is decreased by the joined utilization of solar-based energy and Electric Vehicle (EV) charging. In the realm of being in electricity, Charging the things had become a troublesome errand to perform. In this paper a solar based charging station for electrical vehicle meant and developed. A dc-dc converter is utilized to buck the solar panel voltage to battery voltage and Maximum PowerPoint Tracking (MPPT) is done to streamline the yield from the solar panel. Solitary information numerous yield converter has been proposed to get distinctive battery voltages with input taking care of from solar-based board with inserted framework control. A double processor microcontroller board (SPELEC) is utilized to control the yields of the converter with an opto-coupler circuit included with a control framework on a cell phone with parameters observing of batteries. The re-enactment investigation of the framework is completed in the SIMULINK environment of MATLAB and the equipment framework has been planned.

Keywords: EV charging station, IoT, SPELEC, Maximum PowerPoint Tracking (MPPT), dc-dc converter.

A Hybrid Energy Generation System

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Abstract. The hybrid system consists of the Wind and Solar energy system which are connected to the common DC link. The PV module output is connected to the boost converter to boost the output voltage.

The maximum output from the solar is obtained with the help of incremental conductance method. Wind energy system consists of the PSMG generator to extract maximum output from wind. We use CSMC controller. The proposed System has the advantage of reduced switching device and simple control. Along with the system integration the VSC at the machine side and grid side can mitigate the power quality problems such as the harmonic current, load balancing and voltage regulation. The proposed system will be implemented in MATLAB/SIMULINK to assess the performance of proper controller.

Keywords:PV-Wind hybrid system, Wind energy conversion system (WECS), Composite sliding mode controller (CSMC), Nonlinear terminal sliding mode controller (NT-SMC), Soft switching sliding mode observer (SS-SMO), Permanent magnet synchronous generator (PMSG).

Experimental Determination of State of Charge of Li-ion Battery

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Abstract. State of charge (SoC) is the degree of charge of electric battery comparative with its ability. In an electric vehicle, SoC for the battery pack is which is to measuring fuel. Estimating Soc of a battery directly is not practically possible. A battery pack consists of number of cells arranged either parallel or in series. Different cells have different voltages and currents so measuring a battery pack is difficult. There are different techniques to measure SoC of a battery. The look-into table strategy misuses the immediate planning connection among SOC and the outer attributes boundaries like the open-circuit voltage (OCV), impedance, etc. The notable downside of look-into table techniques is that they are just pertinent when the battery is in the static state for example not exposed to any heap and permitted adequate rest time to accomplish a harmony stage. The coulomb counting method is undoubtedly extensively used approach of estimating SOC. The SOC is measured using this method by calculating a battery's discharging current and integrating it over time. Since this technique is a non-feedback algorithm, errors in SOC estimation is possible. A minor measuring error may have a major impact due to the accumulated effect of the integration operation. This project is implemented with the help of raspberry pi the Kalman Filter algorithm, which was derived earlier, to implement it functionally and to verify the efficiency of our algorithm. Furthermore, by measuring the model parameters using data-driven techniques to estimate SOC of battery under operating conditions of EV and next confirmation with the experimental implementation.

Keywords: State of charge, lithium-ion battery, electric vehicle, model-based approaches, raspberry-pi

A Novel Unified Power-Quality Conditioning System on Line Loading, Losses, and Voltage Stability of Smart Buildings

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ABSTRACT: This paper focus on improvement of stability in terms of voltage distortions, flicker and current harmonics in grid connected PV system using unified power quality conditioner under different load conditions. Photovoltaic system is designed by mathematical analysis. An MPPT based dc-dc boost converter is designed to extract the maximum power from the solar system. A suitable Inverter controller is designed to maintain proper synchronization between grid and PV system. UPQC is one of the custom power device helps to reduce the stability problems. UPQC is a combination of series and shunt controller with a common dc-link capacitor. A Phase Angle Control (PAC) is implemented for series converter of UPQC to regulate the voltage distortions and a PI controller is used to regulate the dc link voltage to generate the reference current for mitigating harmonics in source current caused by load conditions. This proposed system is to be implemented and tested in MATLAB/Simulink and verified the results with different controllers.

Investigation of Properties of Short Term Aged Liquid Dielectrics

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Abstract. In recent years, due to low biodegradability and accessibility, vegetable oils have increasingly replaced traditional mineral oils used in electrical appliances for multiple purposes which the alternative insulating fluids to replace transformer Vegetable oils with excellent dielectric nature are proposed as possible insulation liquids to replace the conventional mineral oils. The studies include both data and theoretical support for the safety of overvoltage faults in power transmission and transformation systems. In this study, the suitability of oils as a stronger resisting medium is investigated. BDV, point of flash, point of fire and viscosity of various vegetable oils, such as coconut oil and palm oil, are all measured. A analysis of the elements, the triglyceride content, and the value of plant oil is used to make a more precise calculation. Natural alkaloid oils have the ability to preempt conventional essential oil, according to research.

Keywords: Insulation, suitability, fatty acid content

IOT Based Bidirectional Meter

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Abstract. Smart grid technologies are developing rapidly in the world. These developments started from consumer side to make grid smart and easier to understand. The basic start is the meters, as many of the meters are normal power meters and only few are net meters. In this paper,bi-directional meters are designed. These meters calculate the bidirectional flow of power. Power bill, advances in smart grid technology and feasibilities provided to customers can be observed by the customer with the help of IoT without any interference of third person. Now-a-days generating units must increase their generation due to the load demand at the consumer side because many of end consumers are not getting sufficient power to run their loads. Distributed generation is one of the best alternatives to meet the load demand. Bidirectional meter is very much useful for consumer to observe transfer of power from consumer to grid and vice versa. With this, expansion of generation system can be reduced drastically. Bidirectional meter measures how much the consumer export and import the power in efficient manner and calculate the bill and communicate to the utility and to the costumers through IoT devices. This continuous monitoring can be done in the IoT platform, so load flow analysis and steady state estimation can also be done for individual user and to the whole distribution system. Experimental results are varying with the error of ± 3% to ± 5% compared to the calculated results. Bi-directional meters become a huge start up for the smart grid implementation in. Bidirectional meters can reduce losses, reduce burden on grid, improve billing efficiency and continuous monitoring by IoT platform.

Keywords: Distribution Generation, Bidirectional meter, IoT (Internet of Things).

Comparison of RTV Coated Insulators Surface Pollution Flashover Characteristics in Different Damage Modes

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ABSTRACT: In this transmission line, the RTV coated insulator has high amount of power contribution. The power rating of RTV coating has high amount of power loses. In emission flashover function, the RTV coating has three harmful modes. The ac flashover performance of RTV coated insulator varies greatly depending on the mode of damage. The RTV coated insulator has high amount of power contribution on the transmission line slightly depending of the power distribution. The tangential power contribution of power system of non coated insulator has high amount of power sources. The electrical power system of waste layer conductivity has an highest power of normal electric field. The field distribution of RTV coated insulator has distributed to the coating but the field contribution of non coated insulator has distributed to the coating. The power system contribution of the characteristics of the emission flashover is so closely linked to the damage modes. The RTV covering application of flashover contracted with different strategies due to its great dielectric properties. In RTV coated insulator, the used coating is NaCl (sodium chloride) has high amount of power contribution in the related amount of the power function. The relationship between SDD and U50 always has negative power function of power rating.

Keywords: present density; waste layer conductivity; pollution flashover; RTV coating damage

Prediction and Analysis of Transformer Oil Using Fuzzy Logic Algorithm

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Abstract. Transformer oil takes a vital place in the performance of transformers. It has high electrical insulating property. Mainly mineral oil is used as transformer oil. The mineral oil has some drawbacks, they are mineral oil have less fire point compared to other insulating oils and It has the property of biodegradability with moisture. Therefore we have to move on with other oils for insulating purpose. Coconut oil, palm oil and some other vegetable oils used for insulating purpose in recent years. In this paper the material characteristic and chemical characteristics of vegetable oils like Coconut Oil, Sunflower Oil, Palm Oil, Rapeseed Oil, were taken into account and their properties were taken into account to choose the suitable alternate for mineral oil. Fuzzy logic is employed for the selection of alternative oil for mineral oil.

Keywords: insulating oil, liquid insulator, transformer liquid insulation, fuzzy logic, mineral oil, insulator properties, prediction,

Grid Interactive Solar PV Based Water Pumping Using NPC-MLI fed BLDC Motor Drive

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Abstract. This paper proposes a bidirectional power flow management of a grid interactive solar photovoltaic (PV) fed water pumping system, using a Neutral Point clamped multi-level inverter. In high-power systems, BLDC motors can be used in various ways. It is easy to build and plan, cheap, and needs less maintenance, and has good efficiency, output, and torque. This paper compares a brushless DC motor (BLDC) fed by a multi-level inverter to a BLDC motor fed by a voltage source inverter (VSI). In the past, multi-level inverters were used for high-power and low-voltage applications. Different inverter forms are used to achieve higher voltage levels. Because of their benefits over other varieties of inverters, clamped multi-level inverters are the most widely used. Compared to a neutral point clamped (NPC) multilevel inverter(MLI)-driven BLDC motor in this analysis, the output of a voltage source inverter-fed BLDC motor.

Keywords: Total harmonic distortion (THD); Torque ripple; Brushless DC motor; voltage source inverter (VSI); Multi-level inverter; Diode clamped multilevel inverter; Total harmonic distortion (THD); Total harmonic distortion (THD).

Power Quality Improvement with Hysteresis Current Controller Based Active Power in Synchronous Generator

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Abstract. The active power filters improve the power efficiency and are normally attached to a normal coupling in parallel with the load (PCC). This is used to compensate for the harmonic structure of nonlinear loads and to balance the principal current and offset reactive energy. The result of the active control filter is that a simplified synchronous generator has a power output powerwith distorted EMF back is of higher quality. A Simulink mat lab for design of an improved synchronous generator is being developed to recreate the active power filter and proposed generator. The simulation of the active power

filter will show significant changes in the generator's output current as well as a reduction in THD in the process.

Keywords: Power Quality, Hysteresis current controller, synchronous generator, shunt active power filter

Closed Loop Control of Bi-Directional Converter with Soft Switching

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Abstract. In this enormous development of technology, the requirements are new per each day. The needs must be satisfied but fulfilling each requirement will generate new desire or need. The technology is evolving day by day because of this recycling process. The invention of fuel-based vehicles shows some de-merits evolving and shifting over to the electrical vehicles. The proposed paper concentrates its main application to be the electrical vehicles, with an improved form of boost as well as buck converter with high voltage gain and efficiency. This shows close loop operation because of its ability to control a drive or electrical vehicle in the place of load. The bi-directional converter adopts quadratic method in proposed model for highly efficient utilization. This paper focuses on the high efficient utilization of bi-directional converter with quadratic property using proportional integral controller for its switching.

Keywords: Social and legal competence, structure, future engineer, professional competence.

Power Quality Improvement Using VLLMS based on Adaptive Shunt Active Filter

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Abstract. With the rise in the number of incompatible devices in the energy system, the issue of power quality has increased. There is a noticeable increase in the harmonic content of the use of converters, as the use of incompatible devices leads like this one increases current sources' performance. Due to this, the increased loss, the total system will be unstable, but the portion of the total system that reflects the signal will have a poor peaks and troughs. In order to reduce harmonic distortion and provide compensation for energy absorption, we use active filters. Different levels of various transformations are applied to the file system. Synthetic filters have less compensation, which is why it is more difficult to get compensation for a false contraction. This paper details how to tailor the active filter using the Variable Leaky technique The controller, which will run using the least-squares form (VLLMS). the controller proposed could charge the complex currents, depending on how unequal and out of proportion the demand is with respect to the available current strengths In order to adjust the DC capacitor voltage to the desired degree, the control and self-charging circuit is employed. Filtration as a patent literature has proved this principle to be well by contrasting active with passive and testing in simulation and reality.

Keywords: APF, harmonics, neural network, power quality, Variable Leaky Least Mean Square (VLLMS)

Design Construction and Performance Evaluation of Aluminium Ion Battery

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Abstract. In this paper a rechargeable, soft package Aluminum ion batteries are fabricated using a carbon cathode. High purity aluminum foil anode and ionic liquid electrolyte is used. We prove that aluminum ion battery's charging and discharging cycles are faster and more efficient.

Keywords: Graphite layered Meshes, Charging Discharging Currents.

Solar PV-Powered BLDC Drive for EVs to achieve Flexible Energy Control Functions using Tri-port converter

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Abstract. The paper presents a TriPort converter coordinated between Brushless DC drive and solar PV, battery to increase the driving distance of electric vehicles. The assurance on battery of the EV's can be reduced. In this system, A BLDC drive is used along with solar PV for better traction characteristics i.e., more starting torque and more efficiency. BLDC motor is suitable for EV's because of its better traction characteristics and for more power density. The main module of this is to control the energy flow from PV panel, battery, grid to BLDC motor. This can be done using Matlab/Simulink to know the efficient working of TriPort converter. For the flexible energy flow to control driving and charging, six modes of operation are developed.

Keywords: Brushless DC motor; tri port converter; PV panal; Matlab/Simulink.

Design and Implementation of Image Processing Based Fire Fighting Robot

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Abstract. This paper mainly deals with the image processing-based firefighting robot. The proposed robot can be able to put the out fires quickly and safely preventing, destruction and rescuing victims to a safer location away from the risk. In previously designed robots, water is only used as a source for extinguishing the fire and they will be operated in only one direction. The proposed robot designed by adding sprinklers with CO2 and image processing is introduced into the robot for its effective operation. When the fire accident is taking place, according to the cause of fire the concerned extinguisher will initiate and extinguish the fire. The proposed work is implemented and tested by image processing-based technology in MATLAB SIMULINK environment. By the image processing-based robot, the number of people present in the room will also be visualized. An experimental investigation is done on proposed work in Arduino environment for validating its functionality.

Keywords: Firefighting, Robot, Image Processing, MATLAB, Sprinkler, Extinguisher

Fuzzy Controller Based Solar PV Fed SRM Drive for Pumping Application

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Abstract. Switched Reluctance Motors (SRM) owing to roughness and simplicity of construction with the advent of compact power converter topologies finding improved role in pumping applications. There are different techniques available to regulate the speed of the SRM drive. This paper presents fuzzy logic based closed loop speed or torque control of 4 kW SRM drive which is powered by solar PV energy. The dc-dc boost converter with maximum power tracking forms the first stage which also maintains a stable dc bus at its output to feed inverter for SRM drive. A simple power converter topology for inverter with reduced power electronic switches is adopted yet a good dynamic response is still made possible A centralized controller with the objectives of maximum power tracking from PV source and speed control of SRM is developed. The control scheme utilizes a fuzzy logic based PI controller to regulate speed for wide range of irradiance levels. The simulation is carried out in MATLAB/SIMULINK. The performance of the proposed drive is evaluated in terms of torque ripple, desired speed and sustained operation for wide range of irradiance

Keywords: Solar PV; MPPT; SRM; pump drive; fuzzy controller

A New Topology of SPV fed Closed Loop DC-DC Converter for BLDC Motor for Water Pumping System

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Abstract. The PMBLDC drives a mechanical Nurse Duties/Associate working a cooler with three-stage VSI through a controlled DC voltage input primarily used as a PM device for improving DC static motor operation: single-pole buck-half-connector (SP-PCC) It could possibly be strengthened with a Diode Rectifier Bridge (DBR). as the required voltage control for the PMBLDC is related to the mechanical speed, the mechanical speed is set to accomplish DC protection. electronic commutator, only There is a controlled shortening of the PMBLD stator curl for the reference voltage at DC interface. Mechanical system in Mat-Sim Each 5 kilowatts, one-per-second PMBLDC engine When it was revealed that ozone depleting substance increased the examination score of the executives, the A-N framework showed greater ability to reveal the AC phenomenon.

Keywords: Voltage Source Inverter (VSI), Mat lab- Simulink, Diode Bridge Rectifier (DBR), Power Factor Correction (PFC),PMBLDCM

Controlling a Three-Phase, Four-Wire, Four-Leg APF with Fuzzy Logic

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Abstract. Now, renewable energy is the new, but to interface it we have static power converters, which has been around for a long time. we propose a new control methodology based on artificial neural network (neural network)theory used in active power filter the current and voltage harmonics are compensated using this renewable energy Four-leg voltage converter topology The AN To both expand and eliminate power distortion, the expander keeps the system's harmonics from rising to unhealthy levels. The proposed framework is modeled with math formulas in the paper. Power mode is simulated using the PI controller or with the FUZZY LOGIC controller, depending on what system you want to expand with Based on the simulation and table, it is seen that the FUZZY LOGIC CONTROLLER PIC controller is superior. According to the design, the circuit is to be modeled in MATLAB/SIMULINK, the results show how strong the system is

Keywords: THD, Renewable Generation System, Active Power Filter, Four-Leg Converters, PI Controller, Fuzzy Logic Controller.

Rechargeable Aqueous Aluminium Ion Battery

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Abstract. Sustainable production and efficient use of energy is a major global challenge, such as universal access to power, environmental degradation, & climate change. Aluminium ion batteries are a fun way to store post-lithium energy. Aluminium ion batteries are is based on ionic liquids that have given impetus to the development of both cathode and anode materials & basic understanding of processes. This work introduces a flexible Aluminium ion battery that saves as much energy as a Lead-Acid & a Nickel-metal hybrid but is renewable faster than others. Rechargeable Aluminium-powered batteries offer the possibility of low temperature, with 3-electron reduction properties for increased capacity. The technology can also be upgraded to power portable devices. These batteries are more reliable than Lithium-Ion batteries. The Aluminium –Ion batteries has a much power as Lead-Acid and Nickel-Metal hydride hybrid batteries but is replenished swiftly within minutes. The battery also boasts a longer cycle life than modern battery technology. Improving high-strength Aluminium-Ion batteries using Bismuth oxide-electrode. The technology can also be upgraded to enable portable devices. They do not work, which means that batteries are safer, less hot.

Improving Reliability of Distribution System using Demand Response

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Abstract: Reliability has become major concern in the recent years. Reliability is an essential quality of a power distribution system. Reliability is the quality of distribution system to provide continuous and uninterrupted power supply to the consumers. Utilities always try to find techniques for enhancing reliability in order to satisfy the consumers. To enhance the reliability of distribution system, utilities use different existed methodologies. In this paper, Demand Response (DR) programs used for improving reliability of distribution system. Indices like System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) are used for reliability evaluation.

Keywords: Demand response (DR), Reliability improvement, Roy Billinton Test System (RBTS), Load Prioritization

Microcontroller Based Cell Balancing of Dead Batteries

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Abstract: Large battery packs are composed of Lithium-Ion, sealed lead acid batteries which are dead we can reuse for 2nd life which are continuously gaining in importance due to their applications in Electric Vehicles. To ensure maximum lifetime, safety, performance of battery pack, complex embedded system

architectures consisting of sensors, power electronics and microcontrollers integrated into the pack as Battery Management System (BMS). Active cell balancing is a promising approach of the BMS to provideequalchargelevelsacrossthecellsinthebatterypackinanefficientmanner. TheprojectedBMS shares a multi-functional switch block for cell voltage observation and cell reconciliation. By sharing observation and reconciliation operation, a cheap BMS with little size may be achieved. MATLAB/SIMULINK schematic of proposed design implemented and will be validated through experimentation.

Keywords: Sealed Lead acid Battery, Lithium Ion Battery, Battery management system, Microcontroller

Optimal Allocation of FACTS Devices in the Transmission System using Teaching Learning Based Optimization Algorithm

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Abstract :The utilization of Flexible AC Transmission System (FACTS) are getting expanded because of their benefits such as enhancing power transfer capability, reactive power compensation, minimizing the power losses and voltage deviations. FACTS devices can be used effectively only by placing them in an optimal location with an appropriate sizing of the device. However, in transmission lines, it is difficult to identify the best location and size of FACTS device. This work proposes Teaching Learning Based Optimization (TLBO) technique for optimal allocation of FACTS devices, namely Thyristor Controlled Series Compensators (TCSCs) and Unified Power Flow Controllers (UPFCs). The objectives here are minimization of active power loss and cost of installation for both TCSC and UPFC. This proposed method is verified on IEEE -14 bus system. This proposed technique is compared with Particle Swarm Optimization (PSO). Accomplished outcome implied active power loss and cost of installation of FACTS devices are reduced better through TLBO as compared to PSO.

Keywords: FACTS Devices, TLBO, PSSO, TCSC, UPFC, Active Power loss

An EV Charging System Using an SMES Implanted SmartGrid

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Abstract. The lifetime of battery of electrical vehicles (EV) has enormous affects at the improvement and popularize of EVs .in this assignment, a way with SMES to balance the EV charging device voltage to better battery life and fee efficiency on a smart grid can be carried out. so that it will affirm the have an impact on that the managed SMES better the device transient balance, conditions beneath load fluctuation and fault, and the SMES capability for machine repayment has to be look into it. The consequences obtain from the proposed work which suggest the effectiveness of compensating the immediately voltage dip within the grid and enhancing the strength system satisfactory will be analyzed.

Keywords: (SMES) superconducting magnetic energy storage.

Analysis of Hybrid ANN-P&O Based MPPT Controller for Photovoltaic System

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Abstract. Photo-Voltaic system efficiency in converting irradiance in to electrical energy faces a huge setback due to partial shading, temperature and irradiance variations in tropic regions. A conventional MPPT controller is used to maximize the conversion efficiency under normal conditions but failed in abnormal conditions. This paper proposes an intelligent ANN-P&O MPPT controller for SEPIC converter utilizes the effective regions of both ANN & P&O methods to identify the global maximum point in order to improve the conversion efficiency of a PV system. The effectiveness of the controller is tested under abnormal conditions and compared with individual counterparts using MATLAB/SIMULINK software.

Keywords: MPPT, ANN, P&O & Hybrid ANN-P&O.

Voltage Oriented Control Applied to a 3-Φ Bidirectional Inverter for Grid Connected PV System

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Abstract. This paper presents a voltage oriented control (VOC) applied on a 3-Φ Bidirectional Inverter for Grid Connected PV System. The bidirectional inverter can perform the two modes of the operation such as grid connection mode (GC) and rectification mode with power factor correction(PFC). Under low current ranges, inductor current have more ripples, with the help of VOC method improve the current distortion and power transfer can takes place smoothly and the problems of synchronization of current to be injected to the grid can be solved by the phase locked loop(PLL). A model of the grid connected PV system had been implemented in the MAT LAB/SIMULINK software and simulation studies have been presented.

Keywords: Voltage Oriented control (VOC), Bi-Directional Inverter, PLL, and PV System.

Design of Hybrid System using PV Module & Fuel cell for Standalone Load

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ABSTRACT:A modern hybrid integrated device design increases performance and enhances energy supply balance. This paper introduces a hybrid system design that incorporates photovoltaic and fuel cell technology. Where there are differences in irradiation, a photovoltaic (PV) typically employs a power point tracking technique to transmit the highest power to the consumer. As well as the atmosphere PV energy has the downside of being an uncontrollable source because its power is dependent on environmental changes. We considered alternative delivery energy sources, such as fuel cells, to address these drawbacks. The adjustments of fuel cell power control the hybrid source output power. As a consequence of this, the hybrid source's reference value.

Key-Words: PEM Fuel Cell, PV module, Matlab/Simulink.

Impact of Electric Vehicles to improve the reliability of IEEE 14 bus System

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Abstract. Today's bulk power system is massive, complex, and very dynamic. The ecosystem friendly and socio-economical merits of Electric Vehicles (EV's) have enhanced its application globally. Although it is widely argued that EVs grid integration undermines power system security, reliability, and upsurge electricity consumption, but the benefits in emission reduction is enormous. Generator outage is made at individual bus and observed that voltages are not within the limits at buses. Later an EV is connected at specified bus, which helps to balance the load and voltages within the specified limits. There are three generators at 1,2 and 3 buses and two synchronous compensators at 6 and 8 buses in IEEE 14 bus system. Thus, the impact of EV's on IEEE 14 bus system under a generator and synchronous compensator outage is tested and the results are validated, which helps to ensure the reliability of system.

Keywords:IEEE 14 bus system, Generator, Synchronous Compensator, Electric Vehicle (EV).

Grid Filter Design Evaluation for 5-Level and 7-Level Voltage Source Inverters

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Abstract. The paper presents a comparative analysis on grid filter performance for five-level and seven-level neutral point clamped inverters. The harmonic analysis is performed for the inverter output voltage to determine worst-case harmonics in the operating range of the inverter. Filter design is carried out for resonance to dominant lower order harmonics and second-order roll-off for switching order harmonics. Simulation is carried out in MATLAB/SIMULINK. Harmonic analysis and filter performance are validated through simulation results. The economic benefit of overall system cost is presented for seven-level inverters.

Keywords: Multi-Level Inverter (MLI), Neutral point clamped (NPC).

A Sensor to Detect the Fuel Theft at Filling Station

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Abstract. The precision is always being whole heartedly welcomed by the people all over the world. It has an important application in the field of automobiles to measure and verify the fuel present in the vehicle with high degree of precision. The previous techniques use analog strip or capacitive sensor which is either inefficient to measure or too costly to install. This project aims on designing a device which can help to actively display the exact amount of fuel and fuel mileage of a motorbike in real time. It involves the making of the system to provide a mileage indicator which is reliable, easy to read and of dependable/compatible overall design. The system comprises of Bike Fuel tank, Power supply, microcontroller (Arduino UNO), ultrasonic sensor (HC-SR04) and with (16 X 2) LCD display. The power supply is given to the Arduino system, the given code is implemented in Arduino and the sensors which are connected to the opening of the fuel tank that are connected to the micro controller and when the given code to micro controller is executed the readings of fuel level is displayed on the LCD display.

Keywords: Ultrasonic sensor,Ardunio,LCD display,Fuel tank.

Techno-economic Analysis of Renewable Energy based Hybrid System for common facilities of Remote Locations in India

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Abstract. A large proportion of India's population is living in villages and it accounts for 70% of the total population. These rural areas are still facing the problems of continuous and reliable electric power supply. However, the Indian government aim is to provide "Power to All" with its availability for 24x7 to all urban and rural areas. After the successful implementation of this mission, these rural areas may be benefitted in terms of improving their lifestyle, better healthcare facilities, and schooling with modern methods. A feasible hybrid renewable energy system is selected for the common facilities of rural areas such as primary and secondary school building, panchayat ghar (Building where Panchayat meets) based on net present cost and greenhouse gas emissions. The outcome of proposed system is analyzed with the other hybrid system and found more accurate.

Keywords: Renewable Energy Resources, Solar Photovoltaic (PV), Hybrid Renewable Energy System (HRES), Biomass

Efficient Control and Battery Bank Optimization for PV Assisted Electric Vehicle Charging Infrastructure

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Abstract. The faster rollout of high power charging stations increases load demand on grid by manifolds. Therefore there is a need for renewable assistance at the high power charging stations. This paper proposes control of dc-dc and bi-directional converters for Solar PV assisted charging station and a novel method for battery pack sizing which utilizes the intermittency of the load. The control algorithms were tested using MATLAB / SIMULINK. A comparative analysis of battery pack sizing is also presented.

Keywords: Charging Station, PWM control, Solar PV.

Fuzzy Logic based Simplified Approach for Short Term Load Forecasting

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Abstract. In India, the demand for electricity is increasing day by day. As on 28th February 2021, the total installed capacity is 3, 79,130 MW of India. The reason for increase in consumption of electricity is due to urbanization, increasing population. It can be concluded that in the upcoming time this demand will keep on increasing. Electricity is generated on the basis of demand. It is, consequently, basic for the electric force utilities that the heap on their frameworks ought to be assessed ahead of time. This assessment of burden ahead of time is ordinarily known as load forecasting. As different constraints of regular methodologies, the accentuation has gradually moved to the use of Artificial Intelligence based methodologies. Fuzzy logic speculation is one of transcendent advancement in Artificial Intelligence. Its application in load estimating depends on periodical comparability of electric burden, where the information factors, yield factors and rules are the central issue. This paper shows short term load forecasting of the average data of 10 years for a selected location with the help of fuzzy logic.Truth is certainly not an outright idea. Fuzzy Logic gives an approach to address levels of conviction. The input data and output data are scaled down to the range of (0.1-0.9).The outcomes acquired from the fuzzy model made are contrasted with the actual value to discover the exactness of the model. The mean absolute percentage error of forecasted demand is 2.376% as compared to actual load.

Keywords: Short Term Load Forecasting, Artificial Intelligence, Fuzzy Logic

Solar Energy Forecasting using Fuzzy Logic and Artificial Neural Network

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Abstract. Forecasting of solar energy is very important while designing and developing the solar photovoltaic system. Because of the variation in meteorological parameters and solar irradiance, power developed by the solar photovoltaic system varies, therefore forecasting becomes important. In this paper a short term solar energy forecasting is being done using fuzzy logic and artificial neural network. Both fuzzy logic and artificial neural network are widely used for forecasting purposes. Fuzzy logic is based on decision making of a human. How it takes decision based on imprecise or vague data. Artificial neural network is based on machine learning. For the development of the model based on fuzzy logic and artificial neural network, various applications provided in the MATLAB software are used. Normalized dataset is used forecasting purpose. For the performance evaluation mean absolute percentage error for both the cases. For Fuzzy Logic it comes out to be 4.02% and for ANN it comes out to be 1.96%.

Keywords: Solar energy, Forecasting, Fuzzy Logic, Artificial Neural Network, Fuzzification, Defuzzification.

Power Source Scheduling and Control of Solar PV Assisted Electric Vechicle Charging Station

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Abstract. A highly reliable charging infrastructure with renewable sources in picture needs an effective electrical interface design, efficient control algorithms and artificial intelligence systems for information exchange and coordinated control. The existing infrastructure such as power electronics for solar PV power extraction, ac to dc conversion at unity power factor with excellent harmonic reduction, energy storage interface, communication providers are available as individual players. A coordinated and efficient control of which is necessary for suitability to charging load characteristics and minimizing conventional source contribution. The proposed work aims at power source scheduling. The intermittent nature charging load allows PV source to supply battery pack during multiple short offload durations. A control algorithm for the same will be designed and tested using m Artix-7 FPGA based digital controller.

Keywords: Charging Station, PWM control, Solar PV.

An Efficient Vedic Based Processing Element for Systolic Array

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Abstract. VLSI technology is used to develop hardware that reaches all the essential functionality within the specified size. In this era of machine learning and artificial intelligence (AI) the need for high performance, special purpose computer systems are sought-after. Tensor processing unit (TPUs), an application-specific integrated circuit, is used in accelerated Machine learning applications. These are

models dominated by Matrix computations which involve extensive arithmetic operation and are considered crucial for numerous signal processing applications. This matrix multiplication can be hastened with the help of special purpose hardware schemes like Systolic arrays [4]. A mesh of PEs is called as Systolic array and here the data generates and passesrhythmically throughout the system. But, the performance capabilities of SAs are limited due to the long critical path delay associated with the PEs. So, the main goal is to reduce the delay of individual PE by employing a more efficient multiplier. Here, in this project we are going to design an efficient multiplier in order to achieve better performance. This work will be simulated and synthesized using Xilinx ISE 14.2i.

Keywords: Processing Element (PE), Systolic Array (SA), Vedic Multiplier.

An Efficient Vedic Based Squaring Circuit for Data Communication

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Abstract. In VLSI technology, many number of components are incorporatedin a single chip to reduce the size of the device. Each arithmetic operation has certain algorithm which connected deeply with technology used for its implementation. Nowadays VLSI technology acts as a platform for those arithmetic operations. In this operations addition and multiplication plays a significant role. Repeated addition of number gives rise to multiplication which is a peculiar case for squaring process. Multiplication based algorithm used for limiting the time taken for squaring the binary numbers. Therefore, squaring circuits were implemented and takes part in almost all fields of signal processing, animation and image processing. In this project, the efficiency of squaring circuit will be analysed to achieve higher results in terms of power, speed and area. This circuit will be modelled by VHDL and synthesis will be processed through Xilinx ISE 14.2i.

Keywords: Adder, Squarer, Vedic multiplier, VHDL.

Prediction of COVID-19 Series Pattern

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Abstract. Corona virus disease commonly called as COVID-19 is the talk of the town now. It is caused by a novel virus called SARS-CoV-2. The infection spread quickly across the world and several large size clusters of the spread have been noticed around the world. The effective way to eradicate the disease is by monitoring the spread of virus, tracking and estimating the outbreak. This will certainly be helpful in any circumstances regarding public health crises. Predicting the spread of COVID-19 is a challenge that the world is facing now. The difficulty in predicting the COVID-19 is lack of availability of COVID-19 dataset. To predict the spread of COVID-19 we made use of the Machine learning techniques like Machine learning Prediction and Forecasting with Time Series Analysis with the available COVID-19 data set. Here in this project we are predicting the COVID-19 confirmed death and recovery cases of different countries based on the available data set. In this project we used Support vector and regression Linear regression methods to predict the spread of COVID-19 .The yield is as time arrangement where one can ready to know the spread of COVID-19 cases in various nations across the world.

Keywords: COVID-19, SARS-CoV-2, Time Series, Linear Regression, Support Vector Regression.

CSRR Based Compact MIMO Antenna for UWB Applications

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Abstract. Monopole MIMO of two element antenna for an application of UWBare proposed. it uses square shaped Split Ring Resonators with Complimentary Model (CSRR) arranging on the patch Plane. The usage of the CSRR with long stubs contributes to gain improvement for the specific applications under UWB band, in turn there is a mutual coupling raised, to overcome the effect of mutual coupling, long stubs are included between radiating elements in the ground plane. The proposed design ranging the impedance bandwidth 2.7 GHZ to 10.65 GHZ for a reflection Coefficient < -10dB, Parametric analysis conducted to investigate bandwidth and gain characteristics. The VSWR and Impedance Characteristics are also analyzed, the work carried out both in simulation and fabrication phase.

Keywords: UWB, MIMO, CSRR, MEG.

Embedded Remote Condition Monitoring System for Industrial Machinery

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Abstract. The current world is focusing on taking work done by a human being to be done by machines. Hence, many machines are increasing day by day, some of which are hazardous, and some are complicated to be monitored or measured using wired/traditional technology, making many industries empower remote condition monitoring. It is safe since the monitoring agent can observe the Machine from a distance. This thesis paper demonstrates a study on an embedded remote condition monitoring system for industrial machinery based on WSN to measure machine Vibration, Temperature, Humidity to minimize risks such as machine damage, injuries and many more. Sensors are used to collect the data from the Machine and the data is transmitted to the cloud from Node MCU via Raspberry Pi, which is used as a computing device and central node. The monitoring agent accesses the Machine performance information on a web page through a cloud platform for lucrative measures. The test was done on a milling Machine with temperature, humidity, and vibration sensors. Further, the result showed an increment in temperature with time as the Machine operates. Humidity decreases as temperature rise; on the other hand, the Vibration was relatively constant under a normal operating condition and varied from low to high when a load is applied. The proper monitoring and annunciation are possible from the system's data, which will minimize the risk and improve the efficiency by appropriate scheduling of work on the Machine.

Keywords: Raspberry Pi, WSN, Node MCU, Condition monitoringSystem, VNC, Webserver, NODE-RED, IoT

Implementation of Solar and Wind Energy in Domestic Household

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Abstract. Wind energy has still a spot, as it can deliver power in the colder season, when less sun is available and when the breeze speed is higher. This paper proposes a response for ease sharp edges from a polyethylene pipe (PE) and an insignificant exertion electric bike generator, which is possible to recognize by me. It is normal as low wind speed wind turbine (LWWT). The arrangement is reasonably overhauled towards a negligible exertion/cleared region, rather than the expense/apparent power. It uses a minor departure from the collapsing tail rule on a HAWT, to avoid springs or a working yaw control. Harmless to the ecosystem power hotspots for instance energy made from daylight based, wind, biomass, hydro power, geothermal and ocean resources are considered as a mechanical decision for delivering clean energy. Regardless, the energy made from sun based and wind is significantly not exactly the creation by oil subsidiaries, nevertheless, power age by utilizing PV cells and wind turbine extended rapidly of late. This endeavor presents the Solar-Wind combination Power system that saddles the supportable force sources in Sun and Wind to create power. Structure control relies essentially upon small scale controller. It ensures the ideal use of resources and consequently improves the profitability as differentiated and their individual technique for age. Also, it extends the unflinching quality and reduces the dependence on one single source. This cream

daylight-based breeze power creating structure is sensible for organizations and local regions fuel sources.

Keywords: solar panel, wind turbine, charge controller, batteries, peak induction current

Pressure, Humidity & Temperature Measuring System using Raspberry Pi in Satellite Communication

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Abstract. For the safety purpose we use many sensors are of different types and with different circuits. The purpose of these sensors is to have safety measures and danger prevention these can examine the results of the sensor in a system or in a personal computer (PC). To get the results in the PC we use different sensors in PCB which contains GPS (neo-6m), Humidity and temperature (DHT11), Barometric Pressure sensor (BMP180), Pi camera module, Raspberry pi (Model P3) with the help of these sensors we can detect the locations, temperature, Humidity, pressure, and image of the location where the danger occurred and these values of the sensors are sent to the computer using raspberry Pi where different signals are converted to digital signals and are easy to process in computers

Keywords: GPS, Raspberry Pi, BMP, DHT11.

IOT based WPT powered Automatic Sanitizers Dispenser

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Abstract. The utilization of sanitizer during the pandemic is a hygiene requirement. One takes personal responsibility for using the hand sanitizer but ensuring the crowd maintains the hygiene practice needed automation systems. The present paper demonstrates the integration of sensors and actuators to make an automated sanitizer dispenser. The integrated components are two IR sensors, Ultrasound Sensor, Relay controlled DC Pump, and Arduino embedded controller. The Model dispenses sanitizer when the hand interrupts the two IR sensors. The level of the sanitizer is monitored over IoT and it's powered through wireless Power Transfe(WPT)r. This project endorses wireless technology to power up IOT Sensor nodes whose actual source is a mere battery/230V AC supply, which is a potential environmental hazard.

Keywords: IR Sensor, Ultrasound Sensor, IoT (Internet of Things), WPT (Wireless Power Transfer).

Object Detection in a Video Footage

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Abstract. In this paper, we have studied how a computer can do the tasks that only a human being can do for example Object detection, Face recognition, Voice Recognition by using Open CV Algorithms. As Computer Technology is increasing day by day lot of new ideas and innovations are being implemented, Self-driving cars this is going to rule the future generation, already this technology in Automation is used in many countries. Artificial Intelligence and Machine learning is very much helpful to do many inventions

by using Computer Technology. Object detection is a well-known Computer technology it relates to the Computer Vision and Image processing this technique is used to detect the objects like human beings, flowers, animals etc. This object detection is used in many areas Surveillance, Automation for self-driving vehicles, Railway Stations and Airlines for monitoring the people. Object detection is mostly used in self driving cars with the help of Computer Vision concepts like Artificial Intelligence and Machine learning this is very much useful in different fields. Object detection can be implemented in many ways and by using different techniques, many researchers implemented with the help of Camera Sensors which can detect objects we have implemented this Object detection with the combination of Image processing and OpenCV Algorithms. To achieve this, we have used different concepts of image processing firstly converting normal image to a gray scale image, detecting the objects in both image file and inbuilt camera, locating the detected object, finally estimating the depth for the detected object. We have used OpenCV library with python 3.5.7.

Keywords: Object Detection, Image Processing, Video Processing, Stereopsis.

State Estimation by Phasor Measurements in Power System for IEEE-14 BUS SYSTEM

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Abstract. Power System State Estimation, being a process to estimate voltage angle as well as the magnitude state for every bus of system of the power that is based on measurements which have been carried at only buses. The devices for the measurement of the earlier days, have only been able to give quantity measured magnitude. Nevertheless, a measurement device with the efficiency known as the Phasor-Measurement-Unit (PMU) which is helpful for the measurement of the phasor of voltage (both magnitude a well as the angle) of a bus at which it's placed as well as the phasors of current of directly connected lines are being used. Since PMUs are very costly, one cannot use PMU measurements only to estimate the state of a power system. Hence, phasor measurements are used as an additional measurement with traditional measurements to estimate the state of a power system. In this paper, use of PMU measurements to estimate the state of a power system has been explained and a MATLAB program has been coded as well as a simulation has been carried out on IEEE-14 bus system for verification of the method. The method uses, a distinct estimator model of the linear state to use the estimate for the state from the WLS, as well as the current measurements and the PMU voltage through the post-processing. First the model estimates the state in polar coordinates using WLS state estimation method from conventional measurements. Then this state, with PMU measurements, both expressed in rectangular coordinates, is used to estimate the final state of the system.

Keywords: Phasor Measurement Unit- PMU, Weight Least Square- WLS, State Estimator.

Analysis of PQ, SRF and I_d–I_q Control strategies for Raising Quality of Power in Distribution System

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Abstract. Power quality is one predominant issue concerning power system. Power network is contaminated with the presence and escalated use of non-linear loads. To recoup the quality of electric power, power electronic based solid state compensators are employed in the network. Solid state converters or FACTS devices extend their usage to diminish the effects of harmonics at the point of common coupling of power distribution network. FACTS controllers are managed with a control methodology to improve the quality in power. This paper renders the extensive analysis of different control strategies to generate reference current signals and oversee the FACTS device in distribution network.

Keywords: Distribution system, DSTATCOM, Control, SRF, PQ.

Design of Tuning Fork Gyroscope Based on MEMS

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Abstract. The old people are suffering from various disabilities due to abnormalities taking place in their bodies because of diseases. There are many problems those can be solved by using MEMS Technology. A design of tuning fork gyroscope is proposed and simulated in which mechanical sensitivity of displacement and capacitance plays a major role in determining the efficiency of the device. Micro-electro mechanical Systems technology (MEMS) to design and simulate the proposed model. The simulation of the gyroscope model is done in COMSOL Multi-Physics. The model is tested for different inputs of Eigen Frequency and Voltage. Here we considered mechanical sensitivity as a progressive element to compare the efficiency of our simulation through the respective values of Mechanical Displacement and capacitance. The value of the required mechanical sensitivity is obtained by calculating voltage, capacitance and displacement with respect to Eigen Frequency and also considering the fact of using different coating elements for a narrow comparison and due to which mechanical sensitivity with respect to capacitance for Germanium and Silicon Combination is 0.399 and Mechanical Sensitivity with respect to Displacement of 86% which is of considerable improvement.

Keywords: Micro Electro-Mechanical Systems, TF Gyroscope, Mechanical Sensitivity, Eigen Frequency, Capacitance, Mechanical Displacement.

An Investigation of a Frequency Reconfigurable Circular Polarized Textile Antenna Bending Effects for On-Body Communication applications

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Abstract. This communication examines the effects of bending on a frequency reconfigurable textenna. The materialized frequency reconfigurable antenna runs in four different configurations, and they are attained by the selective operation of two BAR-64-03W pin diodes in the ground plane. In stand-alone conditions for each configuration, this antenna resonates at 2.4, 4.29, 5.78, and 9.39 in C1. 5, and 5.9 in the C2. 4.4, and 5.8 in C3, and finally 3.5, 4.4, 5.3 in C4. The 2.4, 3.5, 5.8, and 5.9 GHz achieved circular polarization in the configurations mentioned above. The bending of the antenna affects its structural arrangement and leads to mis functioning. So, bending effects should be thoroughly inspected to find the variations in the antenna's electromagnetic behavior. The developed antenna model operates in four configurations, and in each configuration, both the vertical and horizontal bending effects are found out. In all these different configurations, the maximum or minimum variation is 0.35 GHz. Parallel alterations are reported in the axial ratios. The bending analyses' obtained values show a good performance of the antenna in human body curvature circumstances.

Keywords: Bending analysis, reconfigurable antenna, circular polarization,human body circumstances.

A Novel Knowledge Based Classification Algorithm For Satillite Images

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Abstract. This paper examines a classification of the decision-making tree based on machine training in the form of satellite and topographical regimes. The accuracy of the classifier is tested by a test set. Once the classifier is certified, the class label of future unclassified data is predicted. Various classification models, such as decision trees, neural networks, Bayesian faith networks, fuzzy sets and generic models have been put forward. Decision trees are used for classification among these models. The interval classifier and SPRINT are other decision tree classification systems, which focus on allowing the mine of databases which do not fit into main memory only by requiring sequential data scans.

Keywords: Satellite, Topographical, Fuzzy, SPRINT

A Deterministic Approach for Resource Distribution in Cloud Environments

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Abstract. Cloud computing offers scalable tools for industrial applications with high performance. Cloud providers typically offer two forms of use plans: ondemand and reserved. Reserved plans offer cheaper long-term contracting services while on-demand plans are available for short or long periods of time but are more costly. Cloud services should be used to meet incoming client requirements with reasonable costs. In this context, our research work consists of studying and proposing resource allocation strategies in a cloud computing environment where different users share multiple cloud providers' resources while maintaining SLAs specified QoS and security criteria. Dominant Resource Fairness (DRF), which considers dominant user shares, has been proposed. While DRF has desirable properties of equality, it has some drawbacks that the literature has already established. However, with respect to specific resource requirements, DRF and its recent developments are not intuitively rational. DRF failed in some of the areas where it fails to allocate all the available resources to the users. To overcome the drawbacks of DRF there are many alternates provided which are mentioned in the literature survey. However, they failed to address all the problems. We propose a extension of DRF which address the problem of full resource allocation.

Keywords: Resource, DRF, NBS, ERAS, MRPS.

Fuzzy Controller for DFIG Based Wind Farm for Improving the Stability Characteristics in a Micro-grid

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Abstract. This paper comprises of characteristics of a wind turbine connected through a DFIG which is connected to microgrid. Discrete proportional-integral controllers and fuzzy controllers which are applied individually in the vector control controls the active power of wind turbine. Vector control is applied on the rotor side converter for this purpose. By making the rotor voltages in decoupled axis the active power is controlled. The reference frame employed for the induction generator employed in this modeling is synchronous reference frame. For applying the pulses a 3-phase pulse generator is used on the rotor side which is operated as an inverter. Maximum power is obtained by using discrete PI controllers and fuzzy logic controllers. The overshoot in the active power due to discrete PI controllers is reduced by replacing discrete PI controllers with fuzzy logic controllers. Four discrete PI controllers are employed in the vector control scheme, which were auto tuned. By formulating appropriate fuzzy rules the overshoot of active power is reduced. Finally, the active power, rotor pulses and grid voltages are plotted. The entire model is simulated on mat lab/simulink software.

Keywords: Active Power, Grid, DFIG, wind turbine, discrete PI controller, fuzzy logic control, vector control.

Reliability Evaluation of Power Electronic Inverter using Cutset Approach

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Abstract: The development of PV systems for generation of renewable energy has been gaining lot of importance in the present day research. Moreover, probabilistic analysis of the various configuration of PV cell, Power Electronic converters etc. has been considered as the potential area of research with the appropriate assumptions. Evaluation of Basic Probability Indices (BPI) of an inverter configuration as been dealt with in the literature by considering failure of all components will lead to inverter failure, treating all such components in series from Probabilistic Logic Diagram (PLD). However, the evaluation of BPI has not been dealt with considering the operating strategies of the inverter.

In this paper, it is proposed to deal with the evaluation of the BPI for single phase full bridge inverter with R and R-L Load conditions and the results of the proposed methods using cutsets will be compared with an existing method.

Enhancement of Power Quality In Multilevel Inverter Using A Hybrid Controller

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Abstract:
To meet demand of high power ,an advanced Power Electronic Converter is used for electric drives. So, as a substitute for high power and medium voltage situations, multilevel converter structure had been familiarized . A multilevel converter accomplishes high power ratings and also advances the portrayal of the intact system in terms of vocals, besides traumas in the deportments of a motor. Several multilevel converter topologies have been mechanized as diode clamped, flying capacitors moreover cascaded H-bridge multilevel Inverter. According to the survey of literature, the cascaded H-bridge multilevel inverter with detached DC sources is noticeably the suitable topology for medium &high power solicitations power converter. The proposed controller is proved that we obtained output voltage with minimum distortion.

Keywords: MLI, Power converters , Harmonics, Power Quality, Controller

Analysis for Switched Reluctance Motor Converter for Electric Vehicle Application

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Abstract. Now a days Electric Vehicles (EV) are next alternate solution for IC engine vehicles to reduce pollution. Switched Reluctance Motor (SRM) is widely utilized in EV application due to its simple construction and less weight. The main drawback of SRM is its torque ripple, and noise. Torque Ripple is reduced by using current control technique. In SRM Converter is needed for phase commutation. This paper studies and compares various SRM converter topologies like asymmetrical, R-Dump, C-Dump converters. The converter topologies for SRM are simulatedand results are obtained using MATLAB/SIMULINK software.

Keywords: Electric Vehicle (EV), Switched Reluctance Motor (SRM), open-loop, converter, torque, current control

SST Based Medium Voltage Extreme Fast Charger for Electric Vehicles using Fuzzy-PI and ANN Controllers

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Abstract: The development of power electronics devices and the integration of intelligent non-linear loads into the existing grid with the combination of various renewable sources along with batteries are increasing. For achieving the fast response in charging stations for electric vehicles, an efficient control strategies should be introduce when the renewable sources like PV is integrated with the grid along with battery. This paper proposes the utilization of Solid State Transformers replacing

the conventional transformers for achieving the bidirectional power flow in addition to attain the better controlling over the system. To achieve the fast response in the charging station to the Electric vehicles traditional PI controller is replaced with the Fuzzy-PI and Artificial Neural Networks controllers and comparative analysis of these two are also done. The framework of the charging station is done by considering three different levels of voltages in view of achieving practical layout for the project. In order to demonstrate the proposed methods simulations are done using Matlab/Simulink

Keywords: Solid State Transformer (SST), Electric vehicles, Fuzzy-PI, Artificial Neural Networks (ANN), PV, Battery.

Control Strategy of Shunt Active Power Filter for ANN Based Non-Conventional Energy System When Integrated to Grid

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Abstract The paper explains the control schemes of Shunt Active Filter using Switching devices on the base of ANN Theory. The main scheme of this is perfect disturbance minimization performance in steady states and transient states. The project deals with converter with four leg and voltage source which can do compensation of unbalanced currents and harmonic components generated by non-linear loads. Parallelly connected active filter used helps in reducing harmonic currents. The new proposed Artificial Neural Network controller for the enhancement of %THD comparatively. The entire concept of power filter uses ANN controller which is simulated in MATLAB. The suggested circuit in paper are considered at various operating conditions and simulated and shows the potential of the system.

Keywords —APF, Voltage source with four leg converter, ANN controller, Harmonic current reduction.

High Efficiency Active Cell Balancing for Battery Stack Performance Enhancement in PV-Wind Hybrid Energy System and Ultra-Light electrical Vehicles

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Abstract: The main objective of the present work is to improve the battery stack performance by using active cell equalization (ACE) method for PV-Wind Hybrid Energy and electrical vehicle's (EV) systems. Battery management system (BMS) plays an important role in electrical vehicles mainly lithium ion based batteries are used because of its higher performance. This can be achieved by using fly back converter balancing technique with this higher battery performance and life time of the battery stack is improved. In this fly back converter cell balancing, losses are less because it requires less number of switches and N diodes for N batteries for its operation where as conventional cell balancing require N switches connected in parallel with every cell. By comparing with other cell equalization methods it requires less number of active switches gives less losses and more efficient. The input of fly back converter is connected with a total series battery pack voltage depending on the operation of MOSFET this voltage is transfer to secondary's of an each battery cells. Using this effective and faster cell balancing is achieved than the older dissipative and non-dissipative techniques. The proposed control is tested in MATLAB/SIMULINK and the results will be verified to validate the merits of proposed cell balancing method.

Keywords: Active cell equalization (ACE), Battery Management system (BMS), Electric Vehicle (EV), Fly back converter.

Advanced Machine Learning Techniques for State of Charge Estimation in Electric Vehicles

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Abstract: The State of Charge (SOC) is key parameter in battery management system to evaluate state of health, cell equalization and to compute power limits of the battery. An accurate SOC estimation is required to detect perilous conditions and improve efficiency of battery pack. However, estimation is difficult process since it relays on many nonlinear characteristics, aging of battery and complex electrochemical reactions.To estimate SOC conventionally look-up table and Ampere-hours method are used. These are inaccurate as they are prone to process, sensor noise and model approximations. In order to overcome these problems model-based state estimation algorithms are being used. But these algorithms are very complex, require extensive domain knowledge and need to conduct laborious experiments to determine model parameters. To overcome these problems advanced data driven techniques are used. They are less complex and needs less development

time. This paper explores a comparative analysis on advanced machine learning technique for SOC estimation. The techniques are validated using the real-time data acquired from new 2.9Ah Panasonic 18650PF cell dataset by considering temperature variations and Power of the cell. The performance of these techniques is compared based on Coefficient of Determination and Root mean square error. The results show that proposed Random Forest regression analysis outperforms the other traditional machine learning techniques.

Keywords: Battery Management System (BMS), K Nearest Neighbor (KNN), State of Charge (SOC), State of Health (SOH), Random Forest (RF).

Novel Programmable Solar Based SIMO Converter for SMPS Applications with IOT Infrastructure

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Abstract: The technological advancements lead to depend more on electronic goods which consume DC power. The DC appliances need converter circuits that are unique concerning their voltage and current ratings. In this paper, IoT enabled Programmable DC-DC converter is proposed for Solar dependent on DC Loads. The economically viable reconfigurable converter is achieved using a customized IoT board SPELEC. The primary step of the design to feed the SIMO converter from 230-Watt solar panel, the second stage 25 Khz pulses are generated from the SPELEC board to trigger the converter MOSFETs and in the Third stage of design, an MPPT Petrube and Observe (P&O) algorithm is implemented to maintain SIMO converter output Voltage's constant irrespective of the solar panel voltage fluctuations based on duty change in trigger pulses to the MOSFETs. The design aimed to cater to DC loads of different voltages as 9V 12 V and 24 V act as a solar spike. IoT-enabled features are Solar Panel voltage and Load Currents along with Load isolation using Blynk Mobile operated Relay control. The Sensor data is uploaded for visualization and analysis on Thingspeak Cloud. The recorded voltage is in the range of 0 to 12v and current is 0 to 1.5A and power is from 0 to 20watts. The SPELEC Converter performance is compared with the Arduino-based converter and an improvement in ripples is recorded.

Keywords : SPELEC board, SMPS, Programmable controller, Buck converter, Arduino, P&O MPPT Technique, Thingspeak, Blynk

Variable Frequency Drive Optimization with Adaptive Neuro-Fuzzy Inference System

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Abstract: The output power of drive should be controlled to avoid stress on the advanced components in the input power system of the 1-Ø AC source; this is powered to the three-phase (3-Ø) variable frequency drives (VFDs). To deal these issues, an integrated artificial neural network (ANN) and fuzzy logic control (FCL) named as adaptive neuro fuzzy inference system (ANFIS)-based VFD optimization is proposed to mitigate the stresses above the various parts of VFD such as input side, terminal block, direct current (DC) capacitor bus, current harmonics, torque ripple and speed of the induction motor (IM). In addition, the proposed ANFIS with the supervisory learning approach is utilized to regulate the speed with mitigated rise time and settling time of the VFD system. The proposed ANFIS model is simulated in MATLAB/Simulink environment and compared with several conventional VFD optimization The extensive simulated performance shows that the proposed ANFIS-based VFD has achieved better results than conventional VFD optimization techniques

Keywords:: Adaptive Neuro-fuzzy inference system, fuzzy logic control, artificial neural networks, q-axis average current, q-axis ripple control, DC-bus-voltage-ripple, and Adjustable frequency drive.

An Optimized Control Structure for Load Sharing in Autonomous HRES Microgrid System using ANFIS Controller

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Abstract: The scale of power economics and the viability of modern power converters have enhanced the traditional grid to be more resilient by handling various imbalances in the system. Energy management takes a more critical part when the microgrid is islanded. This requires efficient current monitoring to circulate in the system which automatically optimizes the system. Advanced controlling approaches to be integrated for the efficient sharing of harmonics and load imbalances among the power units existing in the system. The sharing of currents will be specified by EMS and referred inputs to the active currents are generated by the local requirements like MPPT from the PV unit. An optimized control structure is developed in this paper for load sharing independently between the energy sources. An Adaptive Network-based FIS controlling structure is designed and integrated into the current loop to increase the effectiveness of task sharing competence and in addition to reduce the voltage imbalances that existed in the system. The ANFIS controller used is effective to reduce the THD% value into permissible limits. To demonstrate the proposed methods simulations are performed by two and three sources of microgrid systems containing PV and Wind as units.

Keywords: Microgrid, PV and wind units, voltage imbalance, harmonic compensation, control structure, current sharing, ANFIS controller.

Fuzzy Controller for DFIG Based Wind Farm for Improving the Stability Characteristics in a Micro-grid

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Abstract. This paper comprises of characteristics of a wind turbine connected through a DFIG which is connected to microgrid. Discrete proportional-integral controllers and fuzzy controllers which are applied individually in the vector control controls the active power of wind turbine. Vector control is applied on the rotor side converter for this purpose. By making the rotor voltages in decoupled axis the active power is controlled. The reference frame employed for the induction generator employed in this modeling is synchronous reference frame. For applying the pulses a 3-phase pulse generator is used on the rotor side which is operated as an inverter. Maximum power is obtained by using discrete PI controllers and fuzzy logic controllers. The overshoot in the active power due to discrete PI controllers is reduced by replacing discrete PI controllers with fuzzy logic controllers. Four discrete PI controllers are employed in the vector control scheme, which were auto tuned. By formulating appropriate fuzzy rules the overshoot of active power is reduced. Finally, the active power, rotor pulses and grid voltages are plotted. The entire model is simulated on mat lab/simulink software.

Keywords: Active Power, Grid, DFIG, wind turbine, discrete PI controller, fuzzy logic control, vector control.

Impact of Energy Storage Device on the Performance of Distributed Generation in Maintaining the Constant Power Flow to Grid

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Abstract: A grid-connected PV system consists of solar panels, power conversion units, power balancing unit and grid link equipment. In the recent scenario people are encouraged install Distribution Generation and local micro Grids are forming. Some micro grids are converting into Smart grids to address Low Voltage Ride-Through (LVRT) which is the major grid code requirement for allowing DGs on line. With increasing penetration of DG, the fault ride through (FRT) capability of DG inverter poses major concern as the failure may lead to serious power system issues and also blackout. In this paper Maximum Power Point Tracking (MPPT) based PV System integrated with an energy storage system considered in such a way that the DG power conversion unit remains connected to grid even during fault conditions as long as conditions specified by modern grid standards are satisfied.

Key words: Low voltage ride through, battery energy storage system, distributed generation, photovoltaic, renewable energy systems.

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