IEEE intelec®

4 - 7 August, 2024 | JW Marriott, Bengaluru, India

41st IEEE International Communications Energy Conference (INTELEC) 2024

Powering Information and Communication Technologies (ICT) for a Billion Lives

PROGRAM BOOKLET

www.intelec2024.org

CONFERENCE MANAGER
GHA CONFERENCES

1 IEEE INTELEC 2024

2. Technical Program

1 Intelec Technical Program

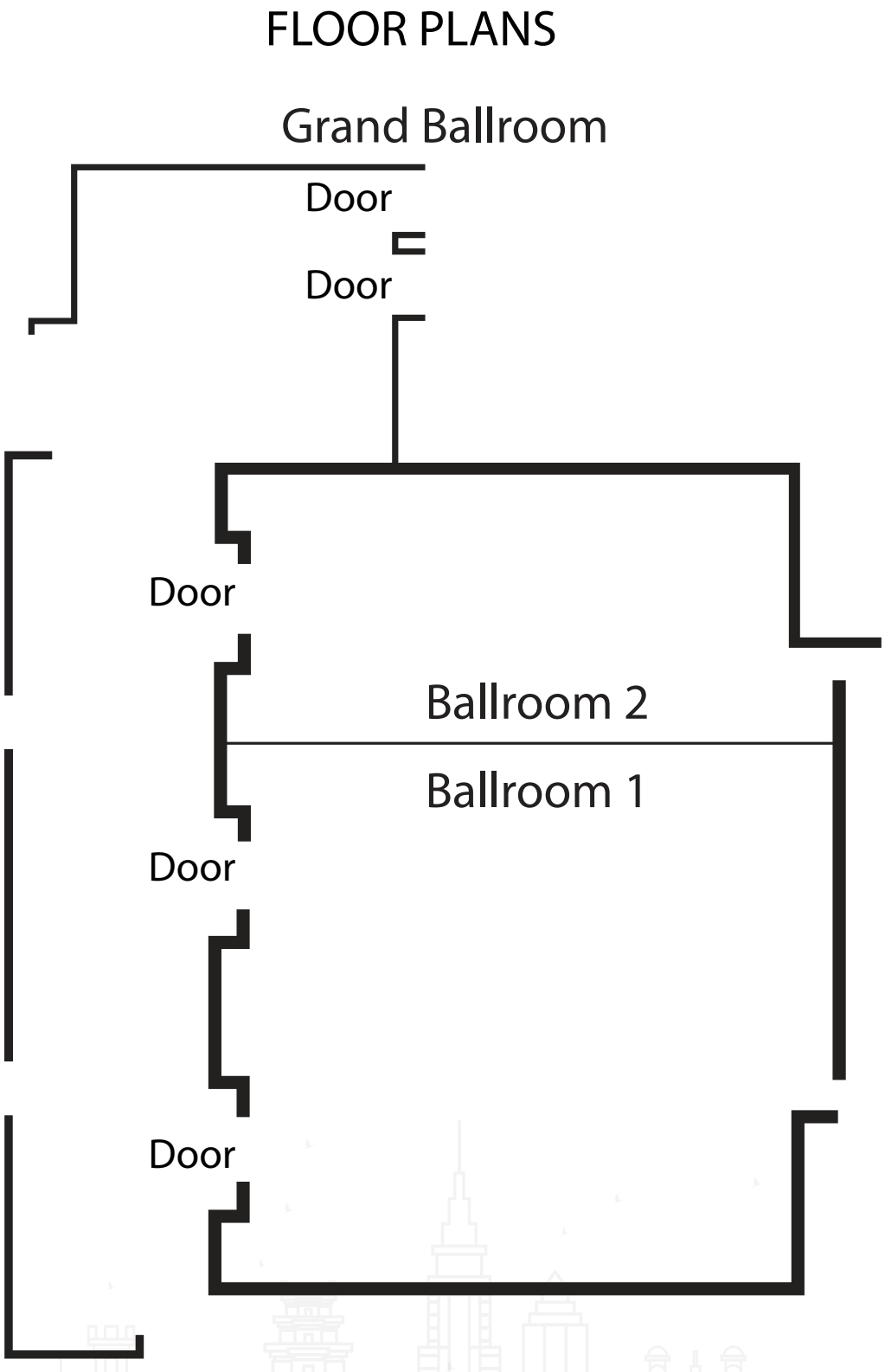
1.1 About Intelec

The 41st edition of International Communications Energy Conference (INTELEC) will take place between 4th - 7th of August 2024, at JW Marriott Hotel in Bengaluru, India. INTELEC 2024 continues to be the world-class technical and information exchange forum that deals with Power Electronics and its applications including information and communications technology networks, power distribution, renewable energy generation, transportation electrification, and space. These topics will be addressed by the global technical and commercial leaders in industry and academia. Several keynote, plenary, oral and poster sessions will be organized to present and discuss the latest state-of-the-art technology in the field. The participants will also have the exceptional opportunity to attend an exhibition where industry leaders will display and discuss their latest products for communications, power and energy systems. Detailed information about the Conference can be found at the official conference website, https://www.intelec2024.org/.

1.2 Venue

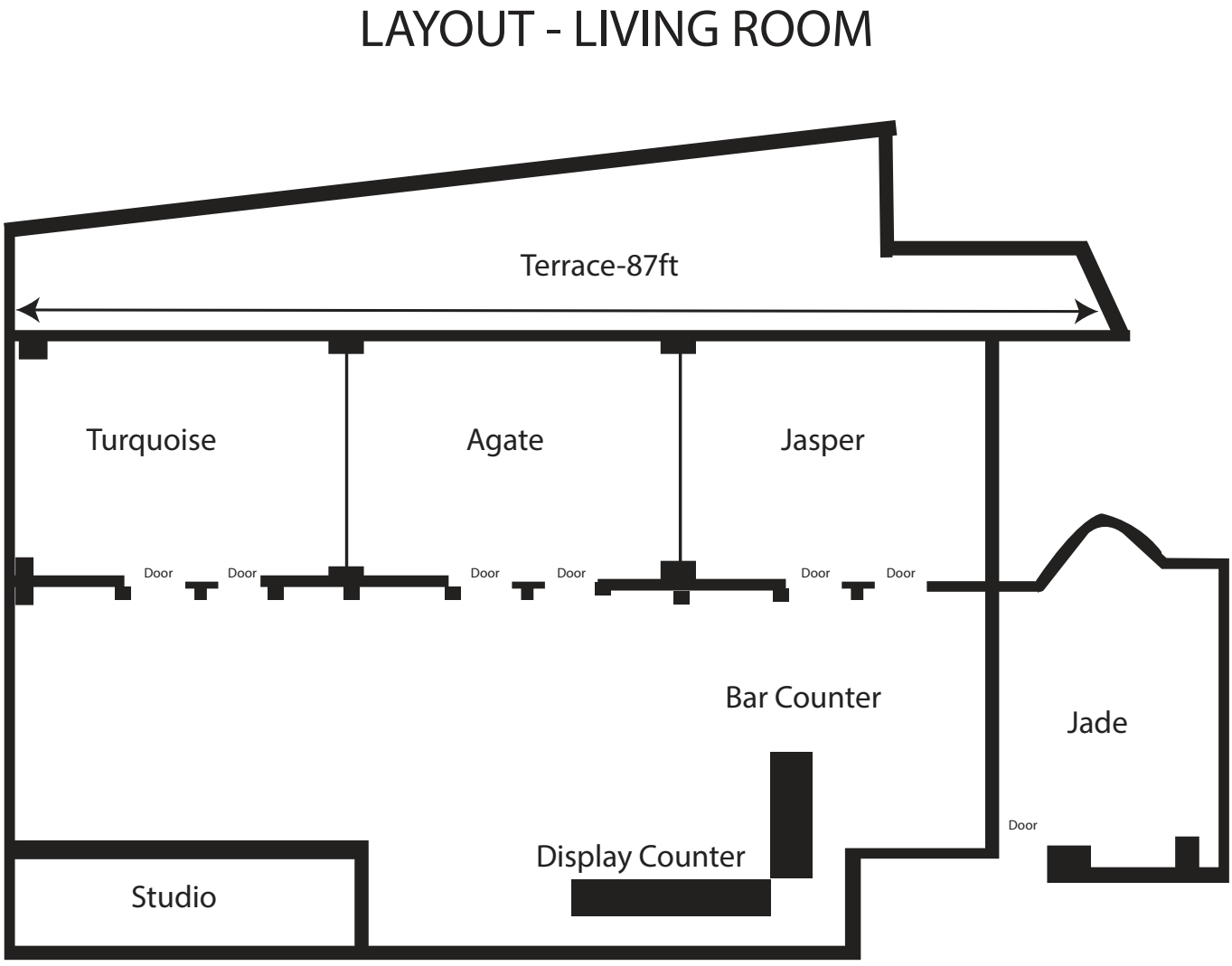
The conference is scheduled to be held between 4th and 7th August, 2024 at the JW Marriot Hotel, Bengaluru. Situated within Bengaluru's Central Business District, 5-star hotel sits just minutes from the green gardens of Cubbon Park and the shops of UB City Mall. The venue is near Mahatma Gandhi Road, the popular neighborhood of Koramangala and other top attractions in Bengaluru. The luxury hotel provides amenities like well-equipped 24-hour fitness center, scenic outdoor pool, tranquil spa and many on-site restaurants. At the end of the day, retreat to a luxury hotel room or suite in Bengaluru with stylish décor, plush bedding, marble bathrooms and private balconies. Expect unforgettable experiences at JW Marriott Hotel Bengaluru.

a) Grand Ballroom Layout



IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

b) Technical Session Room Layout



Total Area - 1886 | L x W x H - 78 x 23 x 11

IEEE intelec®
2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

1.3 Message from General Chair

Bradley Lehman
General Chair
Northeastern University

Dear All,

We would like to invite you to attend the upcoming IEEE International Communications Energy Conference (INTELEC) from Aug 4th-7th, 2024, in Bengaluru, the Garden City of India. In its 41st edition, Intelec continues to be a world-class conference for critical power and energy storage applications, including information and communications technology networks, power distribution, renewable energy generation, and transportation electrification. This year, the conference is being held in Bengaluru, capital of the state of Karnataka and known as the Silicon Valley of India. The city is home to a significant section of the Indian technology sector ranging from start-ups to established behemoths, in sectors as diverse as information technology, automotive, aerospace and defense, biotech and pharma, and many more. Bengaluru also has several top scientific R&D labs such as Indian Space Research Organisation (ISRO) and Defence Research and Development Organisation (DRDO) and academic institutions of international repute such as IISc, NCBS, TIFR, etc.

The conference will be an excellent opportunity to connect and share insights across industry, academia, and nonprofits. Apart from keynotes and plenary sessions by luminaries of the field, the conference will also have interactive sessions and panel discussions with industry experts from diverse backgrounds and provide numerous opportunities for interaction and networking. There will also be industry exhibits/demos and a career fair. Bengaluru is one of the most vibrant and culturally diverse cities of India, with a rich cultural history stretching back to its founding in the 14th century by Kempe Gowda with influences of the powerful states of Mysore and Vijayanagar at Hampi, juxtaposed with the latest trends of today. Bengaluru is also surrounded by a number of scenic destinations - from Nandi Hills in the north to Shivasamudra in the south. There is something for everyone!

So please make a note of the dates and check the conference webpage for more details. Hope to see you at Bengaluru!

IEEE intelec®
intelec 2024 | Bengaluru,India
4 August, 2024 | JW Marriott, Bengaluru, India

1.4 Program at a Glance

08:00AM - 09:00AM | Registration

09:00AM - 10:00AM

Tutorial Speaker

Santanu Kapat
IIT Kharagpur

Title: Large-Signal Design Perspectives for Ultra-Fast Digital Control Solutions in Switched-Mode Power Converters

Venue: Jasper

Tutorial Speaker

Sairaj Dhople
University of Minnesota

Title: Circuit Solutions to Control, Optimization, Modeling, and Analysis Challenges for Power Electronics

Venue: Topaz

10:00AM - 11:00AM

Tutorial Speaker

G Narayanan
IISc Bangalore

Title: Power Electronic Controlled Electromagnetic Bearings to Support High Speed Rotors

Venue: Jasper

Tutorial Speaker

Shamibrota Kishore Roy
Delta Electronics India

Title: Characterization and Modelling of Switching Dynamics of SiC MOSFETs

Venue: Topaz

11:00AM - 11:30AM | Coffee Break

11:30AM - 12:30PM

Tutorial Speaker

Harish Sarma Krishnamoorthy
University of Houston

Title: GaN FET – based Power Converters: Practical Design Challenges and ML-assisted In-situ Health Prediction

Venue: Jasper

Tutorial Speaker

Bhim Singh
IIT Delhi

Title: Challenges in Power Converters Control of Solar Photovoltaic Diverse Applications

Venue: Topaz

12:30PM - 01:30PM

Tutorial Speaker

Supratim Basu
CEO & Managing Director, Bose Research

Title: Designing for EMI/EMC & Safety Compliance: Strategies for Controlling Conducted /Radiated EMI & Safety Issues in Power Electronics Designs

Venue: Jasper

Tutorial Speaker

L Umanand
IISc Bengaluru

Title: Discrete controller design using Octave and Jupyter

Venue: Topaz

01:30PM - 02:30PM Lunch

02:30PM - 06:30PM City Tour

07:00PM - 09:00PM | Welcome Reception

IEEE intelec®

intelec 2024 | Bengaluru,India

5 August, 2024 | JW Marriott, Bengaluru, India

08:00AM - 09:00AM | Registration

09:00AM - 10:00AM | Inauguration

10:00AM - 10:30AM

Keynote Speaker

Kaushik Rajashekara
Univerisity of Houston

Title: Hydrogen and Fuel Cell Systems for Transportation Electrification

Venue: Grand Ball Room

10:30AM - 11:00AM

Keynote Speaker

Homer Alan Mantooth
University of Arkansas Fayetteville

Title: Evolving Semiconductor Technology for Communications Energy Systems

Venue: Grand Ball Room

11:00AM - 11:30AM | Networking Break

11:30AM - 12:00PM

Keynote Speaker

Shashidhar Mathapati
Delta Electronics

Title: Revolutionizing Energy Infrastructure: Cutting-Edge Power Electronics for Enhanced Efficiency and Sustainability

Venue: Grand Ball Room

12:00PM - 12:30PM

Keynote Speaker

Prasad Enjeti
Texas A and M University

Title: Large Language Models and Their Applications in Power Electronics

Venue: Grand Ball Room

12:30PM - 01:00PM

Keynote Speaker

James Massoud
SKAO, Australia

Title: Building the World's Largest Radio Telescope - The Infrastructure Behind the Square Kilometre Array in Australia

Venue: Grand Ball Room

01:00PM - 02:00PM

Lunch

02:00PM - 02:30PM

Invited Talk

Sandeep Anand
IIT, Bombay

Title: Active Capacitor Technology for Single-Phase Applications: EV Chargers and Solar Inverters

Venue: Grand Ball Room

02:30PM - 03:00PM

Industry Talk

Parthasarathy Nayak
Schneider Electric Pvt Ltd

Title: Application of Wide Band Gap Devices in UPSs for Data Centers, Challenges and Solutions

Venue: Grand Ball Room

IEEE intelec®

intelec 2024 | Bengaluru,India

5 August, 2024 | JW Marriott, Bengaluru, India

03:00PM - 03:20PM

Sponsor Talk

Robin Roy
Delta Electronics

Title: Power Electronics applications and its trends DC and Telecom industry

Venue: Grand Ball Room

03:20PM - 03:40PM

Sponsor Talk

Manjula Girish
Delta Electronics

Title: Fast charging infrastructure for EV charging

Venue: Grand Ball Room

03:40PM - 04:00PM

Sponsor Talk

Vivek Bhat
Delta Electronics

Title: Energy Storage for Better Infrastructure

Venue: Grand Ball Room

04:00PM - 04:20PM

Sponsor Talk

Bibhu Prasad Nayak
Bosch Global Software Technologies Pvt Ltd

Title: Electric Vehicles and it's inherent complexity - A simulation perspective

Venue: Grand Ball Room

03:00PM - 04:30PM | Oral Session - 1

04:30PM - 06:00PM | Oral Session - 2

07:00PM - 09:00PM Dinner

IEEE intelec®

intelec 2024 | Bengaluru,India

6 August, 2024 | JW Marriott, Bengaluru, India

08:00AM - 08:30AM | Registration

9:00AM - 09:30AM

Keynote Speaker

Subhashish Bhattacharya
North Carolina State University

Title: Solid State Transformers for enabling DC Distribution Grids

Venue: Grand Ball Room

09:30AM - 10:00AM

Keynote Speaker

Fei "Fred" Wang
University of Tennessee

Title: Medium Voltage SiC Based Power Electronics for Grid Applications

Venue: Grand Ball Room

10:00AM - 10:30AM

Keynote Speaker

Alexander Tessarolo
Texas Instruments

Title: The Rise of Real-Time Control

Venue: Grand Ball Room

10:30AM - 11:00AM

Keynote Speaker

Pat Wheeler
University of Nottingham

Title: Transportation Electrification: Power Electronics as the Enabling Technology for Critical Power in Electric Vehicle and Aerospace Applications

Venue: Grand Ball Room

11:00AM - 11:30AM | Networking Break

11:30AM - 11:45AM

Industry Presenter

Pradeep Kulkarni
Microchip Technology (India) Pvt. Ltd.

Title: High Voltage Silicon Carbide: Enables an Omnidirectional Grid

Venue: Grand Ball Room

11:45AM - 12:00PM

Industry Presenter

Vivek Shivaram
Tektronix Inc

Title: Challenges and Solutions for dynamic validation of Wide Bandgap designs with Oscilloscope solutions

Venue: Grand Ball Room

12:00PM - 12:15PM

Industry Presenter

R. Jeyaraman
CE+T Power

Title: Implementing DC Microgrid Solutions with a Multidirectional Power Converter for The TRANSFO Community

Venue: Grand Ball Room

12:15PM - 12:30PM

Industry Presenter

Navaratan Katariya
Nasscom

Title: Co-Creation with Startups: The Need of the Hour

Venue: Grand Ball Room

IEEE INTELEC®

2024 | Bengaluru,India

6 August, 2024 | JW Marriott, Bengaluru, India

12:30PM - 12:45PM

Industry Presenter

Valmik Suryavanshi
Phoenix Contact India Pvt Ltd

Title: Power to X - Carbon Neutral future with Green Hydroigen

Venue: Grand Ball Room

12:45PM - 01:00PM

Industry Presenter

Rahul Lodhi
Phoenix Contact India Pvt Ltd

Title: Fast Charging Infrastructure for Electric Vehicles

Venue: Grand Ball Room

01:00PM - 02:00PM | Lunch

02:00PM - 02:30PM

Invited Talk

Shiladri Chakraborty
IIT, Bombay

Title: Electro-Thermal Co-Design of a Cooling-Integrated High-Frequency Planar Transformer

Venue: Grand Ball Room

02:30PM - 03:00PM

Invited Talk

Srinivas Bhaskar Karanki
IIT, Bhubaneswar

Title: Empowering India's Rural Population with Community Microgrids

Venue: Grand Ball Room

03:00PM - 04:30PM | Oral Session - 3

04:30PM - 06:00PM | Oral Session - 4

07:00PM - 09:00PM | Dinner + Cultural Evening

IEEE INTELEC®

2024 | Bengaluru,India

7 August, 2024 | JW Marriott, Bengaluru, India

08:00AM - 08:30AM

Keynote Speaker

Brij Singh
John Deere Inc., USA

Title: Power Electronics for Precision Farming with Sustainable and Cleaner Environment

Venue: Grand Ball Room

08:30AM - 09:00AM

Keynote Speaker

Srinivasan Raghavan
IISC, Bangalore

Title: GaN for power electronics applications: The materials and device perspective

Venue: Grand Ball Room

09:00AM - 09:30AM

Keynote Speaker

R K Singh
IIT (Banaras Hindu University), Varanasi

Title: Electric Vehicle Charging Technology: Exploration and Exhortation

Venue: Grand Ball Room

09:30AM - 10:00AM

Invited Talk

Kamalesh Hatua
IIT, Madras

Title: Active gate drive technique for SiC MOSFET

Venue: Grand Ball Room

10:00AM - 10:30AM

Invited Talk

Venugopal Subramaniam
Ametek Programmable Power

Title: Bi-Directional DC and AC power supplies and their applications

Venue: Grand Ball Room

10:30AM - 11:00AM

Invited Talk

Soumya Shubra Nag
IIT, Delhi

Title: Role of Power Electronic Packaging in "Xtreme Power Electronics"

Venue: Grand Ball Room

11:00AM - 11:30AM

Networking Break

11:30AM - 12:00PM

Invited Talk

Pradeep Peter
ISRO, Bengaluru

Title: Spacecraft Power Electronics

12:00PM - 12:15PM

Industry Presenter

Niranjan R Hegde
Tektronix India Pvt. Ltd.

Title: Power- Singal Integrity interdependency Understanding of Power Supply Inducted Jitter

Venue: Grand Ball Room

12:15PM - 12:30PM

Industry Presenter

Preetam Tadeparthy
C2i Semiconductors Pvt Ltd

Title: Co-Creation with Startups: The Need of the Hour

Venue: Grand Ball Room

IEEE intelec®

intelec 2024 | Bengaluru,India

pels IEEE POWER ELECTRONICS SOCIETY Powering a Sustainable Future

IEEE Advancing Technology for Humanity

7 August, 2024 | JW Marriott, Bengaluru, India

12:30PM - 12:45PM

Industry Presenter

Kishor Narang
Narnix technolabs Pvt. ltd.

Title: Architectural and Systems Approach Imperatives for Digital Infrastructure

Venue: Grand Ball Room

12:45PM - 01:00PM

Industry Presenter

PrithviRaj Narendra
Nunam Technologies India Pvt. Ltd.

Title: The need for 2nd life of EV Lithium batteries

Venue: Grand Ball Room

01:00PM - 02:00PM | Lunch Sponsored by Meta

02:00PM - 02:30PM

WiE Event - Sponsored by Meta

Moumita Das
IIT, Mandi

Title: Electric Vehicle Charging Infrastructure and Technologies

Venue: Grand Ball Room

02:30PM - 03:00PM

WiE Event - Sponsored by Meta

Pallavi Bharadwaj
IIT, Gandhinagar

Title: Battery Digital Twin for Performance Optimization

Venue: Grand Ball Room

03:00PM - 03:30PM

WiE Event - Sponsored by Meta

N. Lakshminarasamma
IIT, Madras

Title: Efficient Power Management Techniques for EV and Renewable Applications

Venue: Grand Ball Room

03:30PM - 04:00PM

Networking Break

04:00PM - 04:30PM

Industry Presenter

Will Holland
Analog Devices

Title: Powering the Reliable Transition to a Clean Energy Grid

Venue: Grand Ball Room

04:30PM - 05:00PM

YP Event

Chandan Kumar
IIT, Gauhati

Title: Smart Transformer Enabled Meshed Hybrid Distribution Grid

Venue: Grand Ball Room

05:00PM - 05:30PM

YP Event

Sumit Kumar Pramanick
IIT, Delhi

Title: High bandwidth current measurement of WBG devices and its applications

Venue: Grand Ball Room

05:30PM - 06:00PM

Valedictory Function

1.5 Our Sponsors

Diamond Sponsors

DELTA

Platinum Sponsors

ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™

Schneider Electric

Gold Sponsors

AcBel 康舒科技 ACBEL POLYTECH INC.

LOTUS WIRELESS
Connect with Innovation

Silver Sponsors

AMETEK PROGRAMMABLE POWER

scientific Since 1963

Bloomenergy

Texas Instruments

Meta

Bronze Sponsorship

HIOKI

MICROCHIP

infineon

ventia

Exhibitor

Tektronix

PANTRONICS INDIA PVT. LTD.

nayak Power Systems
PSCAD | RTDS | DSA Tools

YOKOGAWA

QUARBZ
Typhoon HIL

PAYTON PLANAR

KEI Wires & Cables

PVT.LTD. CastNX LIVING INNOVATION

SPELL
SUSTAINABLE POWER ELECTRONICS LABORATORY
INDIAN INSTITUTE OF SCIENCE

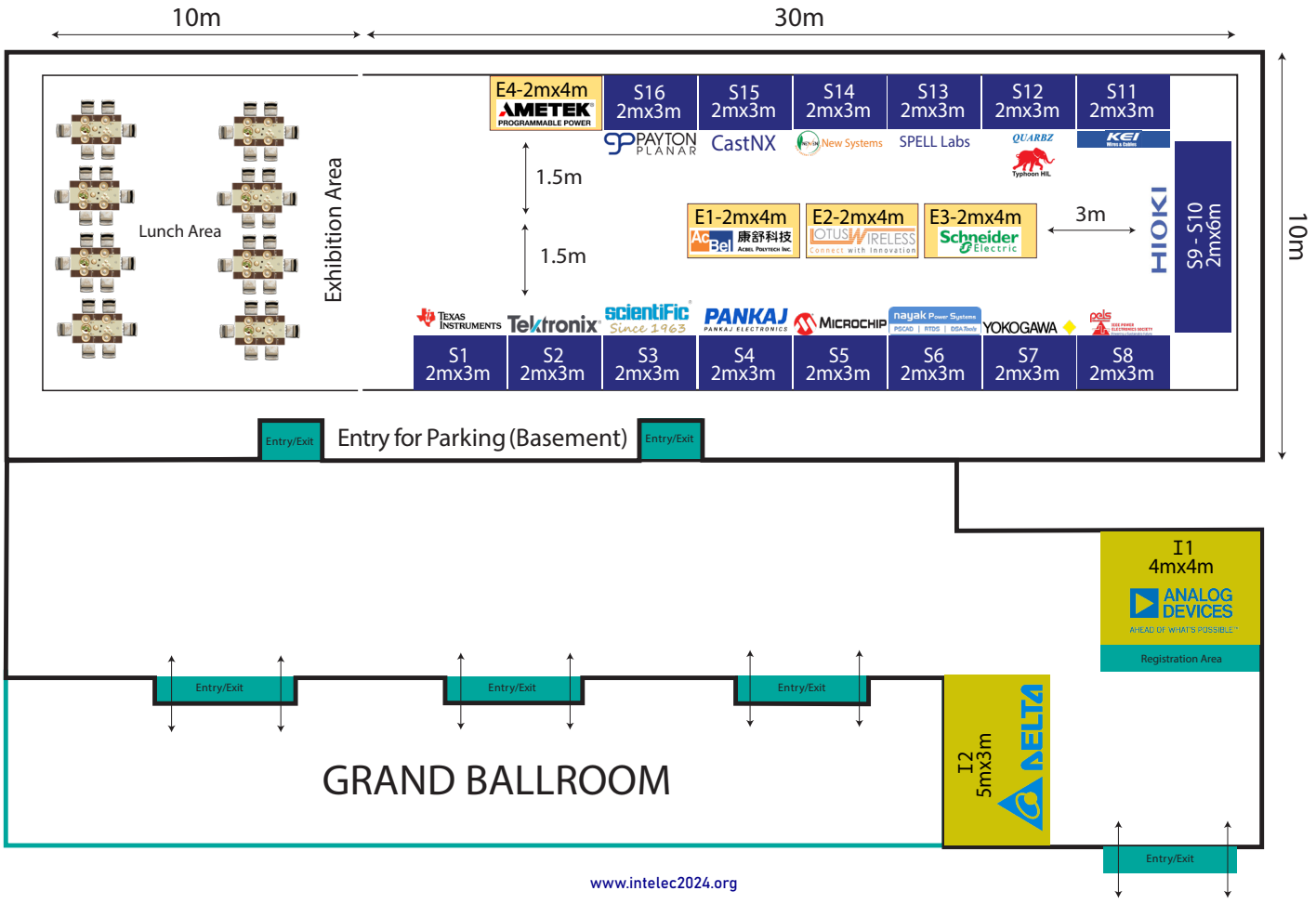
IEEE POWER ELECTRONICS SOCIETY
Bangalore Chapter

Knowledge Partner

K-tech Center of Excellence-IoT & AI powered by MeitY & nasscom

Exhibition Layout

EXHIBITION LAYOUT
4 - 6 AUGUST 2024 | JW MARRI OT, BENGA LURU



IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

1.6 Committee

Committee Members

General Chair

Ned Mohan (Late)
Honorary General Chair
University of Minnesota, Twin Cities

Bradley Lehman
General Chair
Northeastern University

Kaushik Basu
General Co-Chair
Indian Institute of Science, Bangalore

TPC Chair

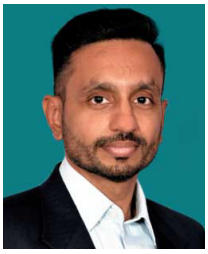
Bhim Singh
Indian Institute of Technology, Delhi

Santanu Mishra
Indian Institute of Technology, Delhi

Harish Sarma Krishnamoorthy
University of Houston

Alexis Kwasinski
University of Pittsburgh

Organizing Committee



Vishal Anand A G
Organizing Chair
Bloom Energy, India

Biju K
Organizing Vice Chair
College of Engineering, Munnar

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

TPC Co-Chair

Anil Gambhir
Mahindra Electric Mobility, India

Arun Umasankar
Mercedes-Benz R&D, Detroit

Ayan Mallik
Arizona State University

Dorin Neacsu
Technical University of Iasi, Romania

Gnana Sambandam Kulothungan
Caterpillar, India

Jinia Roy
University of Wisconsin, Madison

Moumita Das
Indian Institute Of Technology, Mandi

Olive Ray
Indian Institute Of Technology, Bhubaneswar

Prasanna Udupi Rajagopal
Texas Instruments, India

Rajat Channappanavar
MaxLinear, India

Rajeev Kumar Singh
Indian Institute Of Technology, BHU

Saptarshi Basak
Indian Institute Of Technology, Delhi

Sayan Paul
University of Colorado, Boulder

Shamibrota Kishore Roy
Delta Electronics, India

Shiladri Chakraborty
Indian Institute Of Technology, Bombay

Sungwoo Bae
Hanyang University

Saichand Kasicheyanula
Delta Electronics

D. Venkatramanan
Indian Institute of Technology, Bombay

Advisory Committee

Alan Mantooth
University of Arkansas

Bernd Wunder
Fraunhofer Institute for Integrated Systems and Device Technology

Chandan Chakraborty
Indian Institute Of Technology, Kharagpur

Frede Blaabjerg
Aalborg University

G Narayanan
Indian Institute of Science, Bangalore

Jian Sun
Rensselaer Polytech Institute

John Hawkins
TelePower Australia

K Gopakumar
Indian Institute of Science, Bangalore

Kaushik Rajashekara
University of Houston

Krishna Vasudevan
Indian Institute Of Technology, Madras

Liuchen Chang
University of New Brunswick

Mark Dehong Xu
Zhejiang University

Partha Sarathi Sen Sarma
Indian Institute Of Technology, Kanpur

Pat Wheeler
University of Nottingham

Pradeep Peter
Indian Space Research Organization

Prasad Enjeti
Texas A & M University

Sewan Choi
Seoul National University of Science and Technology

Shailesh Ghotgalkar
Texas Instruments, India

Sheldon Williamson
Ontario Tech

Subhashish Bhattacharya
North Carolina State University

Sudip Mazumder
University of Illinois, Chicago

Vivek Agarwal
Indian Institute Of Technology, Bombay

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Local Arrangements Chair

Ashiq Muhammed PE
National Institute of Technology, Calicut

Finance Chair

Prema V
BMS College of Engineering

Tadashi Suetsugu
Fukuoka University

Publication Chair

Pradyumn Chaturvedi
Visvesvaraya National Institute of Technology, Nagpur

Jaison Mathew
Government Engineering College, Thrissur

Sponsorship Chair

Srinivas Bhaskar Karanki
Indian Institute Of Technology, Bhubaneswar

Bijuna K
Thangal Kunju Musaliar College of Engineering

Publicity Chair

Abhijit Kshirsagar
Indian Institute Of Technology, Dharwad

Prasun Mishra
Indian Institute Of Technology, Kharagpur

Tutorial Chair

Arun Kumar Verma
Indian Institute Of Technology, Jammu

Ritesh Kumar Keshri
Visvesvaraya National Institute of Technology, Nagpur

Awards Chair

Ahteshamul Haque
Jamia Millia Islamia

Exhibit Chair

Srinivas Bhaskar Karanki
Indian Institute Of Technology, Bhubaneswar

Bijuna K
Thangal Kunju Musaliar College of Engineering

Industry Chair

Peter Green
Ventia, Australia

Ranganathan G
Bloom Energy, India

Shashidhar M
Delta Electronics, India

Sriram Ramakrishnan
Reliance Industries, India

Rajaganesh Kasthuri
India Center for Lab Grown Diamond, India

Women In Engineering (WIE Chairs)

Moumita Das
IIT, Mandi

Pallavi Bharadwaj
IIT, Gandhinagar

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

4 Aug 2024 | 09:00AM - 10:00AM

Tutorial Speaker

Santanu Kapat
IIT Kharagpur

Title: Large-Signal Design Perspectives for Ultra-Fast Digital Control Solutions in Switched-Mode Power Converters

Venue: Jasper

Abstract: With the growing demand for high performance and efficiency along with high power density and scalability, there are real challenges in identifying suitable power converter architectures, control techniques, modeling, analysis, and design tools. In this context, leading industries are exploring digital control solutions for their future products; however, traditional PWM-based digital control techniques and small-signal-based design approaches are not sufficient in catering to ultra-fast transient requirements in fast-changing servers and AI workloads. This tutorial aims to highlight the underlying modeling and design challenges in digital control solutions, in terms of accuracy, closed-loop stability, achievable performance limits, etc. A hybrid design framework is presented to demonstrate simplicity and accuracy in predicting fast-scale instability. Further, novel large-signal-based design techniques are presented to highlight the feasibility of achieving performance improvement up to the converters' slew-rate limits, much beyond the small-signal bandwidth limit. Finally, some considerations of resonant converters are discussed to show their usefulness and challenges.

Bio: Dr. Santanu Kapat is presently a professor in the Department of Electrical Engineering, at IIT Kharagpur. Dr. Kapat was a visiting faculty with the Department of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign, USA from May to July 2024, and with the University of Padova, Italy from May to June 2023. Dr. Kapat developed two online courses, "Control and Tuning Methods in Switched Mode Power Converters" in 2021 and "Digital Control in Switched Mode Power Converters and FPGA-based Prototyping" in 2022. His research areas include high-performance control techniques in switched-mode power converters, and applications to computing for servers and automotive, data centers, EV chargers, etc. Dr. Kapat is serving as the Associate Editor for the IEEE Transactions on Power Electronics, IEEE Journal of Emerging and Selected Topics in Power Electronics, and IEEE Open Journal of Power Electronics.

Tutorial Speaker

Sairaj Dhople
University of Minnesota

Title: Circuit Solutions to Control, Optimization, Modeling, and Analysis Challenges for Power Electronics

Venue: Topaz

Abstract: Power grids the world over are transforming in form and function with the integration of power electronics across scales. Challenges precipitated by this transition are several and they call for new paradigms for modeling, analysis, control, and optimization. We adopt a circuit-theoretic lens to propose solutions to a few key challenges in this regard. Three instances are presented: a control strategy for grid-forming inverters leveraging the dynamics of nonlinear oscillators, an approach to leverage systematically engineered combinations of digital and analog circuits for real-time optimization of power electronics, and synthesizing equivalent-circuit representations for control- and physical-layer subsystems of power electronics to model their dynamics and quantify large-signal stability. Through these vignettes, we demonstrate the capability to control, optimize, model, and analyze power electronics converters with the flexibility, speed, and universality afforded by familiar circuit elements and circuit laws.

Bio: Sairaj Dhople received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Illinois at Urbana-Champaign in 2007, 2009, and 2012. He is the Robert & Sydney Anderson Professor with the Department of Electrical and Computer Engineering at the University of Minnesota. His research interests include modeling, analysis, and control of power electronics and power systems, focusing on renewable integration.

Dr. Dhople received the National Science Foundation CAREER Award in 2015 and the Outstanding Young Engineer Award from the IEEE Power and Energy Society in 2019. He has also received the 2021 IEEE Power and Energy Society Prize Paper Award and the 2022 IEEE Transactions on Power Electronics (Second Place) Prize Paper Award.

IEEE intelec®
intelec 2024 | Bengaluru,India
IEEE POWER ELECTRONICS SOCIETY Powering a Sustainable Future
IEEE Advancing Technology for Humanity

4 - 7 August, 2024 | JW Marriott, Bengaluru, India

4 Aug 2024 | 10:00AM - 11:00AM

Tutorial Speaker

G Narayanan
IISc Bangalore

Title: Power Electronic Controlled Electromagnetic Bearings to Support High Speed Rotors

Venue: Jasper

Abstract: The tutorial will be on contactless electromagnetic bearings (EMBs) to support high-speed rotors of motors, generators, turbines and compressors. Different radial and axial forces acting on the shaft of a rotating machine will be discussed. Conventional ball bearings, namely, deep-groove and angular-contact bearings, will be introduced briefly. Need for contactless bearings at high speeds will be highlighted. Existing contactless bearing technologies will be reviewed briefly. Construction and operating principles of radial and axial electromagnetic bearings will be discussed. Components and subsystems of an EMB, including the power amplifier, will be detailed. Modelling, analysis and simulation of such EMB systems will be presented. Electromagnetic design and power-electronic-based control of the EMB systems will be discussed in some detail.

Bio: G. Narayanan is currently Professor and ABB Chair in the Department of Electrical Engineering, Indian Institute of Science, Bengaluru, India. He works in the areas of power electronics, motor drives and electrical machines. His research interests include power semiconductor devices, high power converters, multilevel inverter, control of power converters, induction motor drives, reluctance motors and their control, high-speed electrical machines, and electromagnetic bearings.

Tutorial Speaker

Shamibrota Kishore Roy
Delta Electronics India

Title: Characterization and Modelling of Switching Dynamics of SiC MOSFETs

Venue: Topaz

Abstract: SiC MOSFET is a wide bandgap (WBG) power device commercially available in the voltage range of 600-3300V. With superior switching, conduction, and thermal performance, it is in close competition with the state-of-the-art Si IGBTs in this voltage range. In power electronic converters, the non-zero finite product of voltage and current of the semiconductor device during switching transient results in switching loss. Switching transient modelling and estimation of switching loss is helpful in power electronic converter design for selecting power devices and determining switching frequency. Also, it provides insight into the switching process and helps in the proper design of the gate driver and power circuit layout. The switching transient of SiC MOSFET is faster than its Si counterpart, resulting in reduced switching loss. However, it excites device and circuit parasites that may lead to prolonged oscillations, spurious turn-on, high device stress, and EMI-related issues. The nonlinearity of the device characteristics and impact of circuit parasitic makes the switching transient of SiC MOSFET more involved than its Si counterpart. So, the characterization and modelling of switching dynamics of SiC MOSFET are essential. The work is aimed to model the different types of switching transitions (Hard switched and soft-switched transitions) of SiC MOSFET. The model uses the detailed non-linear model of the SiC MOSFET along with the relevant external circuit parasitics. The device parameters are extracted from the device datasheet. Also, simple measurement techniques are proposed to determine important circuit parasitics necessary for switching dynamics study. Based on the proposed switching dynamical model, interactive software is developed in a Python environment. The developed software takes device parameters and circuit parasitics as input and estimates transition time, switching loss, (dv/dt), (di/dt) and transient over-voltage as a function of load current.

Bio: Shamibrota Kishore Roy (Student Member, IEEE) received a B.E. degree from Jadavpur University, Kolkata, India, in 2014 and an M.E. degree from the Indian Institute of Science (IISc), Bangalore, India, in 2016, both in electrical engineering. From 2016 to 2017, he worked as a System Engineer at Cypress Semiconductor, India. He completed his PhD degree from the Electrical Engineering Department, IISc Bangalore in August 2022. From August 2022 to March 2023, he worked as a post-doctoral fellow in the Electrical Engineering Department, IISc Bangalore. Currently, he is working as a principal electrical design engineer at Delta Electronic India Pvt. Ltd. His research interests include the characterization and modelling of wide bandgap (WBG) power devices, high-frequency converter design and packaging, active gate driver design, etc.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

4 Aug 2024 | 11:30AM - 12:30PM

Tutorial Speaker

Harish Sarma Krishnamoorthy
University of Houston

Title: GaN FET – based Power Converters: Practical Design Challenges and ML-assisted In-situ Health Prediction

Venue: Jasper

Abstract: Power converters need to be designed to meet their specific demand based on the application, providing precise voltage and current regulation, fast switching capabilities, and high power density. Power supplies using GaN FETs have been contributing to the advancements in various fields, including aerospace, defense, medical, and subsurface characterization. While these devices are the current buzz in town in the area of power electronics (due to the multiple advantages in efficiency and power density), they also bring several challenges with regard to the practical design. This talk will begin with the introduction of certain niche applications using GaN devices. Then, the speaker will detail some of the practical design details, including the difficulties faced in the layout, EMI, and heat dissipation of converters in these applications, along with a few methods to address them. This will be followed by a description of the reliability characterization of GaN devices and a potential method to predict the health of GaN-based converters in-situ using machine learning.

Bio: Dr. Harish Krishnamoorthy (SM, IEEE) is an Associate Professor in the ECE department of the University of Houston (UH). He received his B.Tech. (2008) in EEE from NIT Tiruchirappalli, India, and his Ph.D. (2015) in ECE from Texas A&M, College Station, USA. He worked for 2-years at GE Energy, Hyderabad, and received Lean 6-Sigma Green Belt certification. He also worked with SLB in TX, USA, for 2-years. He has over 105 papers in refereed publications; and has two granted US patents. He is an Associate Editor of IEEE TPEL. He received awards from UH-Engineering for Research Excellence (2022) and Teaching Excellence (2021). He was named an 'OTC Emerging Leader' by the Offshore Technology Conference, 2022, and an Early Career Research Fellow by US National Academies. He has also received the NSF CAREER Award, the IEEE PELS Young Professional Exceptional Service Award, and NIT Tiruchirappalli's Young Achiever Award, all in 2023.

Tutorial Speaker

Bhim Singh
IIT Delhi

Title: Challenges in Power Converters Control of Solar Photovoltaic Diverse Applications

Venue: Topaz

Abstract: With over 300 sunny days annually, India has a vast potential for solar energy exploitation. This renewable energy source not only reduces dependence on depleting fossil fuels but also plays a crucial role in mitigating climate change by lowering greenhouse gas emissions. Solar PV energy is abundant, cost-effective, and increasingly viable with advancing technology, making it a cornerstone of sustainable development. By end of 2023. In India, solar power capacity has surpassed 50 GW, contributing significantly to national grid, and aiming for 500 GW by 2030 under National Solar Mission. Some of applications solar PV power are as follows.

1. Rooftop Solar: Rooftop solar installations present a transformative solution for both urban and rural environments. They empower homeowners and businesses to generate their own electricity, significantly reducing utility bills and contributing surplus power to the grid. Rooftop solar is growing in popularity due to its scalability, ease of installation, and ability to leverage existing infrastructure. Latest solar power converters enhance system efficiency and reliability, facilitating widespread adoption and fostering energy independence.
2. Solar Water Pumping: In the agricultural sector, solar water pumps offer a sustainable alternative to diesel-powered systems. They provide a reliable, cost-effective means of irrigation, reducing operational costs and environmental impact. Advanced solar power converter control ensures maximum power tracking operation of connected solar photovoltaic array and energy conversion, ensuring consistent water supply, even in remote areas, thus boosting agricultural productivity and sustainability. Solar water pumps have become increasingly popular among Indian farmers due to government subsidies and the rising cost of diesel fuel.

3. Solar Cookers: Solar Cooker based products with multifunctional features like the 'Saurya Urja' invented by Prof. Bhim Singh, is a ground-breaking replacement for traditional cooking fuels like LPG under the Ujjwala scheme. Solar cookers reduce indoor air pollution and deforestation, promoting healthier living conditions and environmental conservation. They also empower rural households by providing a clean, cost-effective cooking solution. Moreover, they can be used for multipurpose applications with a battery to power small necessary utility appliances with the surplus energy stored during the daytime to sustainably power household loads.
4. Marine and Space Applications: Solar power is indispensable for marine and space applications. In marine environments, solar panels power navigation systems, lighting, and communication devices, enhancing safety and operational efficiency. In space, solar converters are essential for powering satellites and space stations, where reliability and efficiency are critical. Hence, proper control of the power converters for such standalone applications are critical for smooth operation of connected equipment.
5. Smart Building Applications: Integrating solar power into smart buildings enhances energy efficiency and sustainability. Advanced solar converters enable economic power coordination with the help of storage and provides multifunctional support to the grid to make system operation and respond to dynamic energy needs.
6. EV Charging Infrastructure: Additionally, solar-powered electric vehicle charging stations support the growth of electric vehicles, reducing reliance on fossil fuels and promoting clean transportation. By 2025, it is estimated that India will have over 2 million electric vehicles, and the deployment of solar-powered charging stations will play a crucial role in supporting this transition.
7. Off-grid Remote Applications: For remote and off-grid locations, solar PV power is often the most feasible energy solution. It provides electricity for lighting, communication, healthcare, and education, significantly improving quality of life and enabling development in isolated areas. Solar converters optimize the energy harvested, ensuring maximum efficiency and reliability.
8. Telecom Tower Applications: In the telecommunication sector, solar power supports the infrastructure required for mobile networks, especially in remote regions. Solar-powered base stations and relay towers ensure continuous connectivity, enhancing communication and digital inclusion. Solar converters ensure these systems operate efficiently under challenging conditions.
9. Military Applications: In military operations, solar power reduces logistical burden of fuel supply, providing a reliable and stealthy energy source for field operations, remote bases, and unmanned systems. Solar converters enhance the efficiency and reliability of these power systems.
10. Microgrid Applications: Distributed energy sources power by solar inverter based microgrid solutions are emerging as an alternative to central power systems enhancing energy sustainability as well as self-sufficiency. Proper control of solar power converters for such applications promote reliable operation of such systems.
Thus, application of solar power converters across various sectors holds immense potential for India's sustainable energy future. By harnessing our abundant solar resources through implementation of proper control of power converters, one can address energy challenges, promote economic growth, and protect our environment.

Bio: Professor Bhim Singh has received his Bachelor of Engineering in Electrical from University of Roorkee in 1977, his Master of Technology in Power Apparatus and Systems in 1979 and Ph.D. in 1983 from IIT Delhi. He was Lecturer (1983-1988), Reader (1988-1990) at University of Roorkee, Assistant Professor (1990-1994), Associate Professor (1994-1997), Professor (1997-2020) at IIT Delhi. Presently, Professor Singh is serving as an Emeritus Professor and SERB National Science Chair at IIT Delhi. He has been ABB Chair Professor (2007-2012), CEA Chair Professor (2012-2017), Head, Department of Electrical Engineering at IIT Delhi (2014-2016), Dean, Academics (2016-2019) at IIT Delhi. He has been JC Bose Fellow (2015-2021), Chairman of BOG, MANIT Bhopal (2018-2021) Non-official Independent Director, NTPC Limited (2018-2021), Chairman of BOG, SVNIT Surat (2023-Present).

His research areas include solar photovoltaic grid interfaced systems, microgrids, power quality, solar water pumping, power electronics, electrical machines, drives and EVs.

Professor Singh is FNAE, FNA, FNASc, FASc, FTWAS, FIEEE, FIET, FIE, FIETE, LM-ISTE, LM-SSI, LM-NIQR, recipient of Bimal K Bose Award of IETE (2001), Maharashtra State National Award of ISTE (2006), IEEE-PES Delhi Chapter Outstanding Engineer Award (2006), Khosla National Research Award of IIT Roorkee (2013), Shri Om Prakash Bhasin Award (2014). IEEE-PES Nari Hingorani Custom Power Award (2017), Faculty Research Award of Careers-360 (2018), Inaugural Faculty Lifetime Research Award of IIT Delhi (2018), IEEE-IAS Outstanding Educator/Mentor Award (2020), INAE Outstanding Teaching Award (2020), first International Solar Alliance- Haryana Kalpana Chawla Solar Award (2020) for working towards developing solutions in Solar Energy Sector to help create a sustainable and low-carbon world for generations to come.

Prof. Singh has guided 121 Doctoral and 182 Master students. He has 64 granted and 44 filed patents, executed 91 sponsored and consultancy projects, co-authored a textbook on power quality: Power Quality Problems and Mitigation Techniques, John Wiley & Sons Ltd. 2015 and published 1262 Journal and 1818 Conference papers. His research work is cited 59668 times with an i10-index of 1041 as per Google Scholar statistics.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

4 Aug 2024 | 12:30AM - 01:30PM

Tutorial Speaker

Supratim Basu
CEO & Managing Director, Bose Research

Title: Designing for EMI/EMC & Safety Compliance: Strategies for Controlling Conducted /Radiated EMI & Safety Issues in Power Electronics Designs

Venue: Jasper

Abstract: This intermediate to advanced level course will begin with an introduction to EMC & Safety including understanding what is UL & CE compliance, followed by an in-depth treatment of various topics like generation of EMI, Controlling EMI at source by design, PCB layout, ground loops, single faults, clearance & creepage, insulation systems, approval process etc. The focus of this presentation is to present everything with as many practical engineering examples/case studies as possible, and thus have a mix of both practice and theoretical explanations and not focus on only theory or physics.

Bio: Supratim Basu received the B.E. degree in electrical & electronics from Birla Institute of Technology, Mesra, India, in 1988 and M.Tech. degree from Indian Institute of Science, Bangalore, India, in 1992. He received the Ph.D. degree from Chalmers University of Technology, Göteborg, Sweden in 2006. He has been working in the Global Power Electronics Industry for over 34 years. Additionally, he has deep academic interests and is keen to share his practice knowledge to the industry and universities - by way of teaching, creating course material, lab experiments, co-supervising Masters & PhD students, delivering tutorials, etc. His main areas of interests are High efficient Switch Mode Converters – mainly as power supplies for Industrial electronics, Medical, Semiconductor, and for Telecom & IT applications, Designing for reducing EMI at source, Thermal Design, and SiC/GaN devices.

Tutorial Speaker

L Umanand
IISc Bengaluru

Title: Discrete controller design using Octave and Jupyter

Venue: Topaz

Abstract: This tutorial sensitizes one to discrete control principles and use of discrete root locus techniques for classical discrete controller design. The topic of PID controller and its discrete version shall also be discussed. Octave and Jupyter are two open-sources tools that can be nicely leveraged to design and prepare on-the-fly documentation of the design process. While Octave is used as the design engine, Jupyter is used as the documentation framework that executes the Octave kernel.

Bio: Umanand is currently a Professor at the Department of Electronic Systems Engineering (DESE) at the Indian Institute of Science, Bangalore. He completed his BE in 1987 in ECE, MTech in 1989 in Electronic Design and Technology and PhD in 1996 in high performance control of induction machines. His current research interests are in electric vehicle eco-system and energy internet.

IEEE intelec®
2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

5 Aug 2024 | 10:00AM - 10:30AM

Keynote Speaker

Kaushik Rajashekara
Univerisity of Houston

Title: Hydrogen and Fuel Cell Systems for Transportation Electrification

Venue: Grand Ball Room

Abstract: With the requirements for reducing the emissions and improving the fuel economy, the automotive companies are developing electric, hybrid, and fuel cell vehicles. Hydrogen fueled Fuel Cell based vehicles are already in demonstration and in limited production stage. Fuel cells are also being considered for propulsion and for on-board power generation in trucks, airplanes, and ships. The use of high temperature fuel cells combined with gas turbines for on-board power generation in ships and aircraft is also getting increasing importance. In this presentation, different fuel cell technologies are examined for transportation and for on-board power generation. Fuel cell-based propulsion system architectures will be presented. The operating strategies of fuel cell vehicles with associated power electronics and control architectures will be presented for automotive and aircraft applications. The current trends for road, air, and marine transportation will be briefly discussed. Finally, the future strategies for using hydrogen and its production for various transportation systems will also be presented.

Bio: Kaushik Rajashekara (Fellow, IEEE) received the Ph.D. degree in electrical engineering from the Indian Institute of Science, Bangalore, India. In 1989, he joined the Delphi division of General Motors Corporation in Indianapolis, USA, as a Staff Project Engineer. In Delphi and General Motors, he held various lead technical and managerial positions, and was a Technical Fellow and the Chief Scientist for developing propulsion and power electronics systems for electric, hybrid, and fuel cell vehicle systems. In 2006, he joined Rolls-Royce Corporation, as a Chief Technologist for electric systems for electric and hybrid aircraft systems. In August 2012, he joined as a Distinguished Professor of Engineering with the University of Texas at Dallas, TX, USA. Since September 2016, he has been a Distinguished Professor of engineering in University of Houston, Houston, TX, USA. He has authored or coauthored over 300 papers in international journals and conferences, has 37 US and 15 foreign patents, and has written one book. He has received a number of awards including the 2022 Global Energy Prize, 2021 IEEE Medal on Environment & Safety Technologies and 2013 IEEE Richard Harold Kaufmann Award for his contributions to electrification of transportation and renewable energy. He is a member of the U.S. National Academy of Engineering (2012) and an international fellow of Indian (20130, Chinese (2021), and Japanese (2024) Academies of Engineering. He is also a Distinguished alumna of Indian Institute of Science. His research interests include power/energy conversion, transportation electrification, renewable energy, and microgrid systems.

5 Aug 2024 | 10:30AM - 11:00AM

Keynote Speaker

Homer Alan Mantooth
University of Arkansas Fayetteville

Title: Evolving Semiconductor Technology for Communications Energy Systems

Venue: Grand Ball Room

Abstract: The MUSiC Fab, The National Multi-User SiC fabrication facility at the University of Arkansas, has begun its operations with the opening of its Phase 1. This phase of the fab commissioning opens with a suite of tools capable of 0.55 m lithography with a 6" Nikon stepper and associated spin/coat/develop tools, furnaces for gate oxide growth, poly deposition, implant activation, and inter-layer dielectric (ILD) deposition; etching tools for ohmic contacts and ILD; and metal deposition and patterning. The second phase, Phase 2, of the fab is a new building under construction scheduled to allow equipment installation beginning February 2025. It will add metrology for process control, ion implantation, and epitaxial growth to the capabilities of Phase 1. As previously indicated, MUSiC will be a SiC device and integrated circuits fabrication facility open to researchers, innovators, government entities, small and large businesses, materials' suppliers, equipment vendors and device manufacturers for the express purpose of furthering research and development of SiC devices and circuits and the processes, materials, and equipment that create these devices. Development in the areas of CMOS circuitry, discrete power devices that can survive harsh environmental conditions will be an initial focus. The fab, which will focus on filling a U.S. gap between university research labs and high-volume manufacturing with low-volume prototyping, will be compatible with high volume manufacturing processes run at X-FAB Texas such that prototypes created at MUSiC may, more easily, be transferred and have a pathway to production. These processes will be tightly monitored and controlled to provide consistent performance and results for its partners, collaborators, and customers. This talk will describe the advances to be sought in SiC integration and how these can impact a variety of applications including those of interest in communication energy systems.

Bio: H. Alan Mantooth received the Ph.D. degree from the Georgia Institute of Technology. After 8 years in industry, he joined the faculty of the Department of Electrical Engineering at the University of Arkansas, Fayetteville, where he currently holds the rank of Distinguished Professor. He is the Founding Director for the NSF Center on GRid-connected Power Electronic Systems (GRAPES), and Deputy Director of the NSF ERC on Power Optimization of Electro-Thermal Systems (POETS). He currently serves as Editor-in-Chief of the IEEE Open Journal of Power Electronics, and Division II Director-Elect on the IEEE Board of Directors. Dr. Mantooth is a Fellow of IEEE, a past President of the IEEE Power Electronics Society, and a registered professional engineer in Arkansas.

5 Aug 2024 | 11:30AM - 12:00PM

Keynote Speaker

Shashidhar Mathapati
Delta Electronics

Title: Revolutionizing Energy Infrastructure: Cutting-Edge Power Electronics for Enhanced Efficiency and Sustainability

Venue: Grand Ball Room

Abstract: TBD

Bio: Dr. Shashidhar is Chief Technology Officer at Delta Electronics India Pvt. Ltd. located at Bengaluru. He has more than 20Y of professional experience in design and development of power electronics products and solutions. He holds Bachelor degree from Gulbarga University, masters from EE department IISC and PhD from Paderborn University. Post joining Delta in 2011 as an engineering manager focused on high power and high voltage power electronics specially for the segment of renewables and energy infrastructure. Since 2019, he is in the current position and heading the RD division.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

5 Aug 2024 | 12:00PM - 12:30PM

Keynote Speaker

Prasad Enjeti
Texas A and M University

Title: Large Language Models and Their Applications in Power Electronics

Venue: Grand Ball Room

Abstract: This presentation highlights the applications of large language models (LLMs) in power electronics. Recently, LLMs have gained significant attention for their versatile capabilities in natural language processing and various tasks. While there is enthusiasm for adopting these AI tools across sectors, their potential benefits and limitations in power electronics require thorough exploration. Key areas of potential LLM applications include design automation, where LLMs can automate the design process of power electronic circuits, generate design specifications, schematics, and code for control algorithms based on prior training, and produce technical documentation and datasheets for power electronic products. Additionally, LLMs can enhance customer support systems by providing intelligent assistance, answering queries, troubleshooting issues, and guiding users/customer support through equipment user manuals. Furthermore, LLMs' fine-tuning capabilities can predict the nonlinear behavior of power electronic circuits, such as DC-link voltage ripple based on operating conditions potentially eliminating the need for a sensor. A step ahead is to predict the capacitor ESR to keep tabs on degradation and eventual failure. As LLMs improve, more applications are expected to emerge in power electronics, and this presentation will capture some of these emerging trends.

Bio: Prasad Enjeti, an IEEE Fellow, holds the Texas Instruments Jack Kilby Chair and has been at Texas A&M University since 1988, with notable contributions to power electronics and power systems. An alumnus of Osmania in 1980, IIT Kanpur, and Concordia University, he champions innovative converter design and interfaces for renewable energy systems, contributing extensively to the field with over 100 journal publications. He's mentored 35 PhD and 53 MS graduates, with his doctoral protégés occupying academic and industry leadership roles globally. His research extends to enhancing cybersecurity and monitoring in industrial control systems.

5 Aug 2024 | 12:30PM - 01:00PM

Keynote Speaker

James Massoud
SKAO, Australia

Title: Building the World's Largest Radio Telescope - The Infrastructure Behind the Square Kilometre Array in Australia

Venue: Grand Ball Room

Abstract: The Square Kilometre Array Observatory will be a next-generation radio astronomy-driven Big Data facility that will revolutionise our understanding of the Universe and the laws of fundamental physics. The SKAO will be composed of two telescopes – one in South Africa and one in Australia. They will comprise hundreds of dishes and thousands of antennas and will be the two most advanced radio telescopes on Earth. This presentation will provide an overview of the project and will explore the infrastructure being deployed at the Australian telescope site that will enable reliable and radio quiet observations in a harsh remote environment. The presentation will cover the challenges and unique solutions being applied to the power generation and distribution systems as well as fibre networks and shielded buildings.

Bio: James is a Technical Director working in Aurecon's Energy & Industrial Service Group. He has broad engineering experience in the design of electrical networks ranging from railway traction power to high voltage transmission and distribution for data centres and other critical infrastructure. He has extensive experience in power system design, carrying out assessments, modelling and testing in a wide range of complex environments including AC and DC railway networks (traction substations, stations and train maintenance facilities), utility substations, data centres, telephone exchanges, commercial buildings, tunnels, underground facilities, mines, pipelines, mobile towers and radio telescopes.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

6 Aug 2024 | 9:00AM - 09:30AM

Keynote Speaker

Subhashish Bhattacharya
North Carolina State University

Title: Solid State Transformers for enabling DC Distribution Grids

Venue: Grand Ball Room

Abstract: The Solid State Transformer [SST] journey from concept to pilot demonstration in a decade will be presented. The SST is shown to be an enabler for DC distribution grids at any node of the AC distribution system. The DC Grid provides an efficient, and economic solution for Data Center power supplies, EV charging infrastructure, DC Microgrids, Electrolysers, and several other applications. The SST for grid interconnection at MV are enabled by the advances in HV SiC power devices at 10-15kV blocking voltages. The design, control, development, and testing of SST with HV SiC 10kV MOSFETs and 15kV SiC IGBTs will be presented. A pilot demonstration of an MV 4160V, 100kVA SST with SiC 10kV MOSFETs will be discussed. Solid State DC Transformers for DC Grids at both MV DC and LV DC enabled with HV SiC power devices integration of distributed and renewable energy will be enumerated.

Bio: Subhashish Bhattacharya is currently Duke Energy Distinguished Professor in the Department of ECE at NC State University. He received B.E. from University of Roorkee [IIT-Roorkee], India in 1986, M.E. from IISc in 1988, India, and Ph.D. from University of Wisconsin-Madison in 2003, all in electrical engineering. He was with FACTS and Power Quality Division at Westinghouse R&D and Siemens Power Transmission & Distribution, from 1998 to 2005. He joined NCSU in August 2005, where he is a founding faculty member of NSF FREEDM Center, ATEC, and DoE PowerAmerica Institute. A part of his PhD research on active power filters was commercialized by York Corporation [now Johnson Controls]. His research interests are Solid-StateTransformers with HV SiC devices, Integration of renewable energy resources, Microgrids, high-frequency magnetics, active filters, and the application of new power semiconductor devices such as SiC and GaN for power converters. His research is funded by several industries, NSF, DoE/ARPA-E, Navy, NASA, and others. He has over 800 publications, 12 patents, H-index of 74, and 23,000+ citations.

IEEE INTELEC 2024 | Bengaluru, India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

6 Aug 2024 | 09:30AM - 10:00AM

Keynote Speaker

Fei "Fred" Wang
University of Tennessee

Title: Medium Voltage SiC Based Power Electronics for Grid Applications

Venue: Grand Ball Room

Abstract: This talk will highlight some special design and control issues of medium voltage SiC power electronics in grid applications. The benefits of using fast switching and low loss SiC in grid applications will be introduced through benchmark comparison with Si technology both at the converter level and the system level. The impact of grid conditions on SiC converter design will be discussed including grounding, unbalance, faults, and transient conditions through a case study on a 10 kV SiC MOSFET based 13.8 kV power conditioning system for distribution grids. Detailed design topics and prototyping will be covered, including 10 kV SiC MSFET characterization, gate driving and protection, high-voltage isolated power supply, controllers and sensors, high frequency transformers, inductors, and thermal management system. Special attention will be paid to high dv/dt, insulation and partial discharge considerations.

Bio: Dr. Fred Wang has been a professor and Condra Chair of Excellence in Power Electronics at the University of Tennessee, Knoxville, since 2009. He holds a joint position at Oak Ridge National Lab and is a co-founder and the Technical Director of CURENT. His experience includes 8 years as an associate professor and Technical Director at the Center for Power Electronics at Virginia Tech, and 10 years as an engineer and R&D manager at General Electric Company.

His current research interests include wide bandgap power electronics and power electronics applications for grid and aviation. Dr. Wang is a fellow of the IEEE and a fellow of the US Academy of Inventors.

6 Aug 2024 | 10:00AM - 10:30AM

Keynote Speaker

Alexander Tessarolo
Texas Instruments

Title: The Rise of Real-Time Control

Venue: Grand Ball Room

Abstract: Real-time control plays a critical role in enabling the renewable energy revolution from power generation (solar, wind) to mobility (electric vehicles). What is real-time control? What are its key characteristics? What makes a good real-time controller? What are the industry trends and challenges?

Bio: Dr. Alexander Tessarolo is a Real-Time Technologist at Texas Instruments. He graduated with a B.E.E. from the University of Technology Sydney in 1988 with First Class Honors, specializing in Digital Control and Digital Signal Processing (DSP).

Joining Texas Instruments in 1989, Dr. Tessarolo has worked in various roles applying DSP devices to real-time control applications such as power conversion and motor control. In 2000, he became the Chief Architect for the C2000 Business Unit, developing specialized Real-Time Controllers used in power conversion (AC-DC, DC-DC), renewable energy (Solar Inverters, Electric Vehicles), and industrial applications (Drives, Servo Motors).

He has architected multiple specialized CPUs (C27, C28, C29) and associated specialized peripherals (High-Resolution PWM, Analog sensing) optimized for Real-Time Control, with 26 US Patents issued in this field.

IEEE INTELEC®
INTELEC 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

6 Aug 2024 | 10:30AM - 11:00AM

Keynote Speaker

Pat Wheeler
University of Nottingham

Title: Transportation Electrification: Power Electronics as the Enabling Technology for Critical Power in Electric Vehicle and Aerospace Applications

Venue: Grand Ball Room

Abstract: This presentation will consider the roadmaps for transportation electrification and the technological developments in use of mission critical power electronics which are going to be needed to make these visions viable. These developments and technology challenges will include the electrical drivetrain design and the applications of motor design and power converter topology choices as well as the impact of emerging technology advances including cooling techniques, integration, system optimisation and wide-bandgap semiconductors. The Challenges for us as Power Electronics or Electrical Machines experts will also be explored and case studies from aircraft, superbikes and trucks used to illustrate the approaches being taken.

Bio: Prof Pat Wheeler received his BEng [Hons] degree in Electrical Engineering in 1990 from the University of Bristol, UK. He received his PhD degree for his work on Matrix Converters from the University of Bristol, UK in 1994. In 1993 he moved to the University of Nottingham and worked as a research assistant in the Department of Electrical and Electronic Engineering. In 1996 he became a Lecturer in the Power Electronics, Machines and Control Group at the University of Nottingham, UK. Since January 2008 he has been a Full Professor in the same research group.

He is currently the Director for Global Engagement in the Faculty of Engineering and the Head of the Power Electronics, Machines and Control Research Group. He was Head of the Department of Electrical and Electronic Engineering at the University of Nottingham from 2015 to 2018. He is a member of the IEEE PELs AdCom and is currently IEEE PELS Vice-President for Technical Operations. He has published over 950 academic publications in leading international conferences and journals.

7 Aug 2024 | 08:00AM - 08:30AM

Keynote Speaker

Brij Singh
John Deere Inc., USA

Title: Power Electronics for Precision Farming with Sustainable and Cleaner Environment

Venue: Grand Ball Room

Abstract: In this lecture a broad review of vehicles for farming operation will be given starting from tillage to crop harvesting. Agriculture and farming vehicles that have significant use of power electronics will be covered such as Exact Emerge Planter for seeding operation. This presentation will cover how power electronics supports crop-care system to exactly apply prescription such as fertilizers, pesticides, fungicide, etc. Idea is to create awareness that power electronics professionals could enable increased productivity so that by 2050 over 9.5 billion could have food, shelter, and an efficient transportation system.

Bio: Dr. Brij Singh is a Region 4 Manager External Relationships and Power Electronics Technical Fellow in John Deere Inc., USA. He has earned bachelor, master, and doctorate degrees from MMMUT Gorakhpur, IIT Roorkee, and IIT Delhi, respectively. In 1996, he joined the École de Technology Supérieure, Université du Québec, Montreal, Canada, as a PDF. In 1999, he joined Concordia University, Montreal, as a Research Fellow. In 2000, he joined the Department of EECS, Tulane University, New Orleans USA as an Assistant Professor. In 2007, he joined John Deere, where he is the Region 4 Manager External Relationships. Dr. Singh has published over 100 research papers. He has 37 granted US patents, one trade secret, and many pending patents. In Tulane, Dr. Singh has received four teaching awards. In John Deere, he has received three innovation and one collaboration awards. He is the winner of the 2020 IEEE Power Electronics Emerging Technology Award. In Feb 2020, he was awarded the "Title of John Deere Technical Fellow in Power Electronics Engineering". In June 2023, US Department of Energy recognized Dr. Singh's outstanding contributions and insightful technical expertise by "Distinguished Achievement Award". In 2022, Dr. Singh was elevated as an IEEE Fellow, he serves as IEEE Power Electronics Society Distinguished Lecturer (PELS DL), and lives with his family in West Fargo, North Dakota, USA.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 08:30AM - 09:00AM

Keynote Speaker

Srinivasan Raghavan
IISC, Bangalore

Title: GaN for power electronics applications: The materials and device perspective

Venue: Grand Ball Room

Abstract: Si, GaN and SiC currently from the troika of materials that are being evaluated for power electronics applications. Given the current status of devices based on GaN, the subject of research of the speaker, it is touted to be the material of choice for 600 V- voltage that has to be withstood in the off state of the device- applications. As one goes to lower voltages, Si becomes increasingly attractive, more from a commercial perspective. As one goes to higher voltages, especially beyond 900 V, SiC starts gaining ascendancy, especially from a reliability point of view. The biggest advantage of GaN is its higher electronic mobility, ~2000 cm2/V-s f(2DEG not bulk) compared to 600 cm2/V-s for SiC and even smaller for Si. This means it can be switched at higher frequencies resulting in smaller passives and therefore system sizes. For the same power level this translates to a higher power density. The biggest disadvantage of GaN is that RF (>1 GHz operating frequency) GaN HEMTs (High Electron Mobility Transistors), a very mature technology that preceded power, are normally on or depletion mode devices with a negative threshold voltage. Power electronics requires normally off or enhancement mode devices with a positive threshold voltage. Converting this normally ON wafers to Normally OFF devices comes with its challenges. Also, most commercial GaN devices for power electronics applications have threshold voltages of about 2 V. Systems designers would prefer higher voltages. Also, unlike SiC and Si, GaN single crystal substrates are not available. The GaN films that are made, on which device technology has been developed, have a lot of material defects that are not present in single crystals. This in turn results in reliability issues and is the prime reason as to why SiC is better currently at higher voltages than GaN even through their band gaps are similar (implying they should have similar breakdown fields). The talk will try to address the two concerns the systems engineer has of GaN devices, positive threshold voltage and reliability, and provide the fundamental materials perspective that is at the root cause of this issue. Addressing these issues by collaboration between materials, device and systems engineers -as has been happening at the Indian Institute of Science over the last few years – is key to making GaN based systems with larger energy densities and lower losses. The talk will also touch upon the capabilities that exist at the Indian Institute of Science that enables such activity and in addition the emerging thread on heterogenous integration to make tinier modules with increasing functionalities.

Bio: Srinivasan Raghavan is a materials engineer by training and works at the interface between the world of materials and devices. He attempts to correlate material structure, as established during thin film growth, to its properties and device performance. Of late, this has been extended to systems performance. The feedback provided helps improve the material at the very beginning to in turn have a positive impact on the subsequent device and system. He has been involved with GaN material development for RF and Power applications since 2000. He is the founder of AGNIT semiconductors pvt. ltd. India's first startup in the device component space and is current setting up a low volume production fab dedicated for making GaN devices. He is currently the Chair as the Center for Nano Science and Engineering, is a member of the team that set up India's largest academic fab at IISc, is a fellow of the National Academy of Engineering and a Abdul Kalam Fellow.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

5 Aug 2024 | 02:00PM - 02:30PM

Invited Speakers

Sandeep Anand
IIT, Bombay

Title: Active Capacitor Technology for Single-Phase Applications: EV Chargers and Solar Inverters

Venue: Grand Ball Room

Abstract: Single phase power electronic converters are quite popular in applications, such as on-board chargers for EVs, power supplies for servers, consumer electronics and photovoltaic inverters. Power buffering is an important aspect in these single-phase converters, to suppress the effects of lower frequency oscillations in power. Conventionally this is achieved using capacitors connected at the dc-link/bus, which are of high capacitance value and voltage ratings. This approach does not effectively utilize the capacitors, increasing the overall size of the converter. The upcoming active capacitor technology has potential to drastically change the way single-phase power electronic circuits are designed. It is a leapfrog jump from the existing bulk capacitor based power buffering method. It uses a combination of power electronics and capacitors to reduce the size and weight of the power converter. This talk will focus on power buffering using Active Capacitor Technology (ACT). Some of the topics to be included in the talk are effects of low frequency power oscillations in single phase systems, especially for on-board electric vehicle chargers and challenges with existing capacitor technologies. Subsequently it will introduce active capacitor technology and present its advantages. Different circuit topologies used in literature and their design challenges would be presented. The talk will also include, some of the recent research carried out by the speaker's research group in this area.

Bio: Dr. Sandeep Anand is a teacher and researcher in the field of power electronics. His work focuses on three key areas: making EVs sustainable and green through renewable integration in the grid, enhancing the efficiency and compactness of EV power electronics using wide bandgap devices (such as SiC & GaN), and ensuring high reliability of EV power electronic components. He received the B.Tech. and Ph.D. degrees in electrical engineering from the Indian Institute of Technology Bombay, Mumbai, India, in 2007 and 2013, respectively. He had brief stints in Industry, working previously with Emerson Network Power, Mumbai, and Cosmic Circuits Pvt. Ltd., Bengaluru, India. From 2013 to 2020, he was a faculty member at the Indian Institute of Technology (I.I.T), Kanpur, India. He is currently a Professor with I.I.T Bombay, India. He is also the professor-in-charge of the C'72 EV PowerTrain laboratory at I.I.T. Bombay, group leader for power integration at the National Centre for Photovoltaic Research and Education (NCPRE) and faculty advisor for the IIT Bombay Student Racing Team. Dr. Anand has been recognized with the "C1973 Research Excellence Award" by IIT Bombay in 2024, was named an "INSA Associate Fellow" by The Indian National Science Academy (INSA) in 2023, Young Scientist Platinum Jubilee Award" by The National Academy of Sciences, India (NASI) in 2019, and Young Engineer Award" by Indian National Academy of Engineering (INAE) in 2017.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

6 Aug 2024 | 02:00PM - 02:30PM

Invited Speakers

Shiladri Chakraborty
IIT, Bombay

Title: Electro-Thermal Co-Design of a Cooling-Integrated High-Frequency Planar Transformer

Venue: Grand Ball Room

Abstract: In traditional power electronic system design, electrical and thermal considerations are often addressed separately and sequentially, potentially leading to less-than-optimal system designs. For example, when aiming to maximize power-density of a high-frequency transformer-based converter, electrical design optimization may lead to selection of a smaller core over a larger one. However, the smaller core may pose greater challenges for cooling, necessitating larger thermal management components such as heat sinks or heat exchangers. This can ultimately result in a lower overall system power density compared to using the larger core. This talk will highlight the importance of electro-thermal co-design optimization of magnetics by considering, as a case-study, the design of a high-frequency planar transformer with an integrated thermal management system involving a liquid-cooled chamber for combined core and winding cooling. Effect of design variables like number of turns of the transformer and height of the cooler on the transformer's electrical parameters such as leakage inductance, ac resistance and parasitic capacitance is estimated. Similarly, thermal modeling is used to characterize the thermal performance of different designs, evaluated on the basis of the required coolant temperature to maintain the transformer winding and core at a specified temperature. Based on a combination of the preceding analyses, optimal designs are identified which simultaneously ensure good electrical and thermal performance.

Bio: Shiladri Chakraborty is an Assistant Professor in the department of Electrical Engineering at IIT Bombay. He completed his B.E. from Jadavpur University in 2008, M.Tech. from IIT Kanpur in 2012, and Ph.D. from IIT Kharagpur in 2019, all in electrical engineering. From 2008-2010, he was with Tata Motors Ltd., Ahmedabad, and from 2018 to 2021, he was a Postdoctoral Associate at the University of Maryland, College Park, MD, USA. His research interests include dual-active-bridge converters, PV inverters, wide-band-gap semiconductor switch-based converters, integrated packaging of power electronics, and high-frequency magnetics.

6 Aug 2024 | 02:30PM - 03:00PM

Invited Speakers

Srinivas Bhaskar Karanki
IIT, Bhubaneswar

Title: Empowering India's rural population with community microgrids, two pilot projects under execution.

Venue: Grand Ball Room

Abstract: Renewable integrated microgrids are gaining popularity in remote locations or village areas where grid is not available. The reliability of autonomous microgrids depends on battery capacity and the presence of other sources like biogas/biomass due to the stochastic behaviour of renewable energy. Overcharging and discharging scenarios force the microgrid into an insecure zone. Increasing the storage capacity is not an economical solution because of the additional maintenance and capital costs. Thus, in order to improve the reliability and optimize the requirements of battery energy storage, interconnecting different microgrids is a good solution. Actual experiences of an advanced microgrid in Keonjhar India comprises PV, storage, biomass, biogas and synchronization with a previously established microgrid will be presented. The talk also discuss another project on design and develop cost-effective floating solar energy generation technologies and infrastructure for achieving sustainable, nearly zero-energy villages.

Bio: Srinivas Bhaskar Karanki is an Associate Professor at the School of Electrical Sciences, Indian Institute of Technology Bhubaneswar, Bhubaneswar, India. He received his B.Tech. degree from Acharya Nagarjuna University, Guntur, India, in 2007, and his Ph.D. degree in electrical engineering from the Indian Institute of Technology Madras, Chennai, India, in 2012. From 2012 to 2014, he was a Post-Doctoral Fellow at the Centre for Urban Energy (CUE), Ryerson University, and Toronto, Canada. He is a senior member of the IEEE Power & Energy Society and Power Electronics Society. Dr. Karanki was the chapter chair for IEEE Power Electronics Society Bhubaneswar Chapter (2019-2021) and is currently the Indian Liaison for IEEE PELS. He was awarded the POSOCO-2013 Best Thesis award for his doctoral thesis. Dr. Karanki was also an academic visitor at the University of Warwick, Coventry, United Kingdom, in 2019. He has participated in UK India research projects as a principal investigator from IIT Bhubaneswar for UKICERI (UK India Clean Energy Research Institute). Dr. Karanki was awarded the Director's Commendation for Outstanding Services 2020 (Faculty Members) for Counseling Services in 2021 and the Teaching Excellence Award in 2022. He has been involved in several other research projects as PI and Co-PI sponsored by DST, Odisha State. His current research interests include power electronic converters for renewable energy systems, power quality, energy storage, and power electronics applications in power systems.

IEEE INTELEC 2024 | Bengaluru, India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 09:00AM - 09:30AM

Invited Speakers

Rajeev Kumar Singh
IIT (Banaras Hindu University), Varanasi

Title: Electric Vehicle Charging Technology: Exploration and Exhortation

Venue: Grand Ball Room

Abstract: Electric vehicle charging infrastructure need to follow some charging standards and communication protocols for safe and reliable charging operation of e-vehicles. The charging standard covers the different types of charging unit based on its size, power rating and charging speed. Three different types of charging levels such as level 1, level 2 and dc fast charging are categorized as per the available charging infrastructure. Moreover, charging connector is an essential entity of the e-vehicles charging infrastructure and are available in different variety for different types of charging. A variety of DC and AC connectors are used for different levels of e-vehicle charging. In addition, e-vehicle industries use variety of communication channels along with communication protocols for reliable and safe charging operation. Li-ion batteries are commonly used in e-vehicles however, the charging of Li-ion battery pack of the e-vehicle is very critical operation and it requires an energy management system for the battery pack during charging operation. Battery Management System (BMS) is a technology dedicated to oversight electric vehicle's battery pack, which is an assembly of Li-ion battery cells, electrically organized in row×coulmn configuration to supply targeted range of voltage and current for a duration of time against connected load scenario. The BMS has two primary functions for a battery pack: 1) keep charging and discharging operation of a battery pack safe, 2) keep the operation of a battery pack reliable. The BMS monitors cell voltage, battery pack voltage, battery current and battery cells temperature and performs various algorithms using these parameters in order to estimate state of charge (SoC), state of health (SoH) and state of envelope (SoE). BMS is used to measure voltage and stop charging when the desired voltage is reached. At that point, they might shut down the power flow; in the event of irregular or dangerous conditions. BMS also offers voltage balancing for the individual cells of the battery pack and improves overall health of the system.

Bio: Prof. Rajeev Kumar Singh received his B.Tech. degree in Electrical Engineering from the College of Technology, Pantnagar, India, in 2001, his M.Tech. degree in Electrical Machines and Drives from the Indian Institute of Technology (Banaras Hindu University), Varanasi, India, in 2003, and his Ph.D. degree in Electrical Engineering from the Indian Institute of Technology Kanpur, India, in 2013. He is currently a Professor and Head of the Department of Electrical Engineering at the Indian Institute of Technology (Banaras Hindu University).

His research interests include renewable power conversion for hybrid microgrids, power conversion for electric vehicles/hybrid electric vehicles, optimal charging/discharging of energy storage systems, and converter modeling and control. Prof. Singh has published 43 Transaction/Journal papers and 91 IEEE conference papers, authored 2 book chapters, and holds 2 patents. He has supervised 7 Ph.D. and 53 master's students, and has successfully completed 7 sponsored projects, with 6 more currently underway. He is working on developing next-generation low-cost onboard technology to improve the EV charging infrastructure in the country.

Prof. Singh served as an Associate Editor of IEEE IES IteN in 2016 and is currently an Associate Editor of IEEE Transactions on Industry Applications.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 09:30AM - 10:00AM

Invited Speakers

Kamalesh Hatua
IIT, Madras

Title: Active gate drive technique for SiC MOSFET

Venue: Grand Ball Room

Abstract: Due to parasitic inductance in the layout, switching of SiC MOSFET is rich in voltage and current overshoot. To mitigate this issue, switching process can be actively controlled which will ensure symbiotic presence of moderate amount of layout parasitic inductance in the circuit. This technique can be used in several other applications like series connection of SiC devices.

Bio: Kamalesh Hatua was born in West Bengal, India. He received a Ph.D. in Electrical Engineering from the Indian Institute of Science (IISC), Bangalore, Karnataka, India, in 2011. He has worked with BEM Ltd., Mysore, India, and Honeywell Technology Solutions Laboratory, Bangalore, India. He was a Postdoctoral Research Fellow with the FREEDM Center, North Carolina State University, Raleigh, NC, USA. Currently, he is an Associate Professor with the Department of Electrical Engineering at the Indian Institute of Technology (IIT) Madras, India. His research interests include medium-voltage electric drives, automotive drives, polyphase induction motor drives, active gate driving for SiC switches, solid-state transformers, and the design of highly efficient power converters using SiC power switches.

7 Aug 2024 | 10:00AM - 10:30AM

Invited Speakers

Venugopal Subramaniam
Ametek Programmable Power

Title: Renewable Energy generation, Energy Storage Techniques, Test Compliance Standards

Venue: Grand Ball Room

Abstract: The intent to give an overview how to select different regulation modes and other parameters to test for a given application using Bidirectional DC and AC power supplies. Trying to see how I can explain in a conceptual manner. Right now, different suppliers might use different terminologies would try to cover the conceptual part of it.

Bio: Venugopal Subramaniam is working as an Engineering Director for Ametek Programmable Power in Bangalore. He has over 20 years of experience in end-to-end new product development activities, including AC and DC programmable power supplies and reactive power compensation products. He is particularly interested in leading development teams working on power electronics-based product development for various applications.

7 Aug 2024 | 10:30AM - 11:00AM

Invited Speakers

Soumya Shubra Nag
IIT, Delhi

Title: Role of Power Electronic Packaging in "Xtreme Power Electronics"

Venue: Grand Ball Room

Abstract: Power electronics converters have been evolving towards high-density integration in recent years, largely driven by the advantages of using wide-band gap devices (WBG) like SiC MOSFETs and GaN HEMTs. These devices can handle higher power, switch faster, and withstand higher junction temperatures than traditional silicon devices, making them ideal for high power, high frequency, power dense applications. Currently employed packaging techniques such as bond-wire or clip-ribbon technologies, are prone to degradation over thermal cycles due to die-attachment related failures. Newer packaging techniques like flip-chip bonding, direct bonding, PCB embedding die, etc., which eliminate the need for bond wires, can improve the reliability by reducing die-attachment related failures. These packaging techniques, especially PCB embedded die technology, help to optimize the design of power electronic converters for high density integration by reducing parasitics. Embedding SiC/GaN dies within printed circuit board (PCB) using copper layers of PCB and micro-vias is a promising fabrication technique. The potential to achieve low loop inductances has made PCB-embedding an advantageous packaging technique for high density power converters. This talk aims to discuss the role of power electronic packaging techniques in achieving high temperature, high power density, high efficiency power electronic systems or in short "Xtreme Power Electronics".

Bio: Soumya Shubhra Nag is an Assistant Professor at IIT Delhi, New Delhi, India. He received a Bachelor of Electrical Engineering degree from Jadavpur University, Kolkata, India, in 2009, and Master of Technology and Ph.D. degrees from the Indian Institute of Technology Kanpur, India, in 2011 and 2017, respectively, all in electrical engineering. From January 2017 to July 2018, he was a Research Fellow with the Rolls-Royce Corporate Laboratory, at Nanyang Technological University (NTU), Singapore. His research interests include Power Electronics for e-mobility, Solid-State Transformers, Renewable Energy, PCB-embedded power, PCB-embedded current Sensing, and Condition Monitoring of Power Electronic Systems and Components.

7 Aug 2024 | 11:30AM - 12:00PM

Invited Speakers

Pradeep Peter
ISRO, Bengaluru

Title: Spacecraft Power Electronics

Abstract: The talk gives an overview of the architecture of spacecraft power electronics. The architecture of power electronics depends on the power requirements of the spacecraft and its load profile and orbit. There are two basic types of power busses. The first type is the battery tied power bus. This power bus is built with a battery charge regulator that controls the battery charge current and taper voltage. The other type of power bus is realized with a solar array voltage regulator. Here the bus voltage is in closed loop. There are different types of battery charge regulators and solar array voltage regulators. Fully regulated bus voltage can be generated by use of battery discharge regulators along with solar array voltage regulators. The solar array is the only power source for the spacecraft while the battery is the energy storage element. These have to sized optimally to meet the requirements. In addition to voltage and charge regulators, there are different types of sensors for power control and monitoring and electronic relays and fuses for power distribution.

Bio: Pradeep K. Peter has done B.E in Electronics and Communication Engg. from National Institute of Technology Trichy, M.E in Electronics and Communication Engg. from Birla Institute of Technology Ranchi and Ph.D from the Dept. of Electrical Engg. of Indian Institute of Technology Bombay. He was given the 'Excellence in Ph.D research' award by IIT Bombay for his doctoral thesis.
He presently works as the Group Director of Power Systems Group in U. R. Rao Satellite Centre, ISRO, Bangalore.

7 Aug 2024 | 02:00PM - 02:30PM

Invited Speakers

Moumita Das
IIT, Mandi

Title: Electric Vehicle Charging Infrastructure and Technologies

Venue: Grand Ball Room

Abstract: Amid growing concerns about the depletion of natural resources (oil and gas) and escalating air pollution causes requirement of alternative solution. Hence, the global efforts towards development of sustainable transportation are underway. In this aspect, the governments, automakers, and consumers collaborate to embrace a shift towards this environment friendly solution. The pressure to reduce carbon emissions are increasingly turning to electric vehicles (EVs) as a key solution to this environmental challenge. The EVs market is also expanding by providing a wider array of choices at increasingly attractive price. Hence, the EVs have emerged as a promising green alternative to mitigate carbon emissions, making significant strides in the transportation industry's pursuit of sustainability. The energy storage plays a pivotal role in the advancement of EVs. The batteries of EVs requires periodic charging for its operation. The charging can be accomplished through either off-board (fast) or on-board (slow) chargers of EVs, which operates according to diverse charging patterns and charging rates. These patterns significantly influence both battery performance and lifespan. Therefore, it is crucial to adopt an optimal charging strategy to achieve shorter charging times and prolonged cycle life.

Bio: Moumita Das has received a Ph.D degree from the Department of Electrical Engineering at the Indian Institute of Technology Bombay, Mumbai, India. After completing her Ph.D., she conducted postdoctoral research in the School of Electrical and Electronics Engineering, University of Manchester, Manchester, UK, and in the Department of Electronics Design, Mid Sweden University, Sweden. Currently, she is an Assistant Professor at the Indian Institute of Technology Mandi, India. Her research interests include converter topologies (modeling, design, and control) with a focus on electric vehicles, storage technology, wide bandgap devices (GaN/SiC) applications, reliability analysis, and high-frequency magnetics.

7 Aug 2024 | 02:30PM - 03:00PM

Invited Speakers

Pallavi Bharadwaj
IIT, Gandhinagar

Title: Battery Digital Twin for Performance Optimization

Venue: Grand Ball Room

Abstract: Battery digital twin can be used for optimizing the battery pack performance, increase its lifetime and ensure operational safety by using data driven modelling and control algorithms. This talk will cover: Battery modelling from simplicity to precision. Uncertainty aware battery temperature prediction. Battery degradation and aging mechanisms. Lifetime extension charging algorithms. Battery management system's role in performance optimization.

Bio: Dr. Pallavi Bharadwaj is an Assistant Professor at the Indian Institute of Technology, Gandhinagar. She has previously served as a Faculty in Aalborg University, Denmark. She completed her Postdoctoral Research at Massachusetts Institute of Technology (MIT), USA in 2021 after receiving her Ph.D. from the Indian Institute of Science (IISc), Bengaluru, India in 2019. Pallavi is a Gold Medalist for her industrial training and has received several awards including the POSOCO Power System Award, Bhaskara Advanced Solar Energy Indo-US fellowship, and has served in several National and International Technical Committees since 2017. She is very passionate about sustainability and strives towards engineering optimized solutions for global energy needs. Her research interests broadly include design and control of renewable power conversion systems; modelling and optimization of energy storage solutions; physics-inspired AI for smart power electronics towards net zero transition.

7 Aug 2024 | 03:00PM - 03:30PM

Invited Speakers

N.Lakshminarasamma
IIT, Madras

Title: Efficient Power Management Techniques for EV and Renewable Applications

Venue: Grand Ball Room

Abstract: Power Management Techniques meeting the steady state and dynamic specifications also enhancing the efficiency of power conversion are discussed in this talk. The power converter topologies, control algorithms and its different variants for varying applications including space, defence and renewable energy applications are presented. The impact of leakage inductance of transformers on the steady state performance of high gain converter topology for high power applications shall be discussed. On a similar line, the impact of parasitic capacitance of transformers on the steady state performance and design of high gain converters for pulsed low power applications shall be presented with a design example. The learning outcome of the development of high gain high power and high gain low pulsed power applications shall be discussed.

Bio: Dr. N. Lakshminarasamma obtained her Ph.D. degree in Electrical Engineering from the Indian Institute of Science, Bangalore. She is currently a Professor with the Department of Electrical Engineering, Indian Institute of Technology Madras Chennai, India. Prior to this, she has put in 4 years in academics; she has worked as a software engineer in I2 Technologies India Private Limited and as a systems specialist in GE Healthcare India Limited. Her areas of interest are power electronics, Switched-mode power conversion and renewable energy systems. She has co authored several journal papers in peer reviewed journals, including the IEEE Transactions on Power Electronics and several premier conferences. Prof. Lakshmi is a Fellow of the Institute of Engineers (India) and she is a recipient of the SERB Power Fellowship outstanding women researcher award 2022 from the Department of Science and Technology. She is a recipient of the prestigious Bimal K Bose award 2022 from Institute of Electronics and Telecommunications IETE for outstanding contributions in the area of Power electronics. She has co-authored several journal papers in peer-reviewed journals, including the IEEE Transactions on Power Electronics and several premier conferences, and holds 10 patents on power conversion systems related to space and defense applications.

7 Aug 2024 | 04:30PM - 05:00PM

Invited Speakers

Chandan Kumar
IIT, Gauhati

Title: Smart Transformer Enabled Meshed Hybrid Distribution Grid

Venue: Grand Ball Room

Abstract: Significant installation of renewable energy sources, storage, and electric vehicles can induce problems such as voltage and current limit violations, reverse power flow, absence of inertia and consequent stability problems, poor power quality, etc. Smart transformer (ST) is a promising solution for avoiding such a changing grid scenario leading to strong grid reinforcements. The ST is a power electronics-based transformer with effective control and communication functionalities with the capability to control the voltage and power flow in electric grid. The ST provides features of conventional power transformer in a distribution grid, and also other benefits such as voltage control, frequency control, load compensation, and interfacing link for various ac and dc infrastructures, thus improving the flexibility of the system. In this talk, Chandan Kumar will highlight the different possibilities and capabilities of ST in distribution grid to develop and realize meshed and hybrid distribution grids.

Bio: Chandan Kumar received the B.Sc. (Engineering) degree from the Muzaffarpur Institute of Technology, Muzaffarpur, India, in 2009, the M. Tech. degree from the National Institute of Technology, Trichy, India, in 2011, and the Ph.D. degree from the IIT Madras, India, in 2014, all in electrical engineering. He is currently an Associate Professor with the Electronics and Electrical Engineering Department, Indian Institute of Technology Guwahati, Guwahati, India. From Dec. 2016 to Nov. 2017, he was an Alexander von Humboldt Research Fellow with the Chair of Power Electronics, University of Kiel, Germany. His research interests include power electronics application in power systems, power quality, and renewable energy. He is an Associate Editor for IEEE Systems Journal, IEEE Open Journal of Power Electronics, IEEE Open Journal of the Industrial Electronics Society, and IEEE Access Journal. He is the chair of the Technical Committee on Renewable Energy Systems of the IEEE Industrial Electronics Society since 2023.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 05:00PM - 05:30PM

Invited Speakers

Sumit Kumar Pramanick
IIT, Delhi

Title: High bandwidth current measurement of WBG devices and its applications

Venue: Grand Ball Room

Abstract: The higher bandgap of wide-bandgap (WBG) power semiconductor devices has resulted in reduced die area compared to similar rated Si devices. This leads to increased power losses per unit area in the semiconductor die. In the event of a fault in a converter, the fault current abruptly rises through the semiconductor devices leading to increased power loss in the channel, which eventually leads to device failure. The short circuit withstand time (SCWT) of the WBG devices has been reported to be substantially low compared to Si IGBT which is a preferred device in high power applications. Hence, a fast fault protection scheme is required to reliably protect the WBG devices in a converter. However, a fast fault protection scheme would require a current sensing technique which can detect device current increasing with a high slew rate. Traditionally, Rogowski coils have been employed to detect current with high slew rate owing to its property of being sensitive to rate of change of current with time. However, to detect fast changing current of WBG devices in power circuits the Rogowski coil has to be embedded within PCB to link the magnetic flux generated by current through the terminals of devices. The PCB embedded Rogowski coil and an integrator circuit forms the basis of the proposed high bandwidth current measurement system. With this proposed current sensor, an analog overcurrent protection circuit is implemented to protect WBG devices during Hard-Switched Fault (HSF) and Fault Under Load (FUL) conditions. The device current information is critical for many applications related to control, and condition monitoring of power converters. The proposed current measurement system has been employed to implement peak current mode control in DC-DC converter and threshold voltage estimation.

Bio: Dr. Sumit Kumar Pramanick is working as an Assistant Professor in the Department of Electrical Engineering since 2018. His area of expertise is in the field of design of power electronic converters and their control for applications like machine drives, renewable energy, and e-mobility. His research group in IIT Delhi is currently working towards the development of high-power density power converters for EV battery charging using energy-efficient power devices, high bandwidth embedded current sensors, high-frequency magnetics design, and wireless power transfer technology. Prior to joining IIT Delhi, he was a Post-Doctoral Fellow at the Cullen College of Engineering at the University of Houston, Texas. He completed his doctoral research in the Department of Electronic Systems Engineering, Indian Institute of Science, Bangalore on 2016. He graduated with an MTech from the Department of Electronic Systems Engineering, Indian Institute of Science, Bangalore. He graduated with a BE from the Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, Shibpur. He is the recipient of the Indian National Academy of Engineering (INAE) Young Engineer Award 2020.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

5 Aug 2024 | 02:30PM - 03:00PM

Industry Talk

Parthasarathy Nayak
Schneider Electric Pvt Ltd

Title: Application of Wide Band Gap Devices in UPSs for Data Centers, Challenges and Solutions

Venue: Grand Ball Room

Abstract: Uninterruptible power supply (UPS) systems are the key component of mission critical data center infrastructures. Thus, there is constantly increasing demand to make UPSs more efficient, modular, scalable and flexible for ease of integration into existing systems. The existing UPS systems rated for 1 to 2MW utilize state of the art Si IGBTs to develop the core power conversion unit. The efficiency and the power density of these units can be further improved by utilizing wide band gap devices such as silicon carbide (SiC) MOSFETs instead of Si IGBTs. However, it is not very straightforward to retrofit SiC FETs into existing IGBT based UPS systems. This talk will focus of the practical challenges industry is facing to move from IGBT based systems to SiC based systems and the approaches being taken to address these issues for development of reliable and intelligent energy solutions.

Bio: Parthasarathy Nayak received the M.S. degree in electrical engineering from the Indian Institute of Technology Madras, Chennai, India, in 2016, and the Ph.D. degree in electrical engineering from the University of Houston, Houston, TX, USA, in 2019. From 2019 to 2021, he was a Senior Power Electronics Engineer with Emerson Climate Technologies Inc., Sidney, OH, USA. From 2021 to 2024, he worked as a Specialist Engineer at Eaton Research Lab (ERL), Southfield, MI, USA. Since July 2024, he has been with Schneider Electric, Data Center Systems division, Bangalore, India, where he is currently a Principal Technical Expert (Power Electronics). He has authored/coauthored more than 25 refereed conference and journal papers and has four granted U.S. and India patents. His research interests include matrix and multilevel converter topologies and control, wide bandgap device-based power converters and active gate driver design, electromagnetic interference/electromagnetic compatibility mitigation techniques, and power electronics application in energy storage and power system.

IEEE INTELEC 2024 | Bengaluru, India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

6 Aug 2024 | 11:30AM - 11:45AM

Industry Presenter

Pradeep Kulkarni
Microchip Technology (India) Pvt. Ltd.

Title: High Voltage Silicon Carbide: Enables an Omnidirectional Grid

Venue: Grand Ball Room

Abstract: Whether building a new grid infrastructure or modernizing an existing power infrastructure, today electric power grid is often inadequate to meet the surging demand of the electrification of everything. This can be attributed to common centralized grid architecture and one-way power flow. Enhancements to a smart grid should support an efficient, resilient and reliable critical power infrastructure. Silicon Carbide (SiC) technology can be the catalyst to sustain an omnidirectional grid a grid where energy can be obtained from anywhere (centralized and decentralized energy sources), at anytime to anyone. This presentation will describe how SiC solutions can decentralize our grid, make it more intelligent and efficient and reduce emissions for a more sustainable future.

Bio: Pradeep Kulkarni is a product marketing manager of Microchip's silicon carbide business unit and is based in Bangalore, India. He leads the Sustainability market segment for the company's mSiC™ Products and solutions.

Prior to Microchip, Pradeep has worked with other leading power semiconductor companies and has over 14 years of experience in the roles of product management, product marketing and business development. Pradeep holds a Bachelor of Engineering in Electronics from Mumbai University and an EMBA in Product Leadership from CMR University.

6 Aug 2024 | 11:45AM - 12:00PM

Industry Presenter

Vivek Shivaram
Tektronix Inc

Title: Challenges and Solutions for dynamic validation of Wide Bandgap designs with Oscilloscope solutions

Venue: Grand Ball Room

Abstract: Wide Band Gap (WBG) devices are a rapidly growing trend in the field of electronics and power systems due to their faster switching, higher efficiency, and higher thermal conductivity. WBG device dynamic characterisation tests are plagued with noisy waveforms due to poor test setup, parasitic ringing, and insufficient rise time for current measurement. Currently, most dynamic characterisation happens without a standard test plan because of which the tested parameters are not repeatable at end user boards. Engineers usually make these measurements manually by saving the waveforms from scopes and exporting to another software, which leads to slower test times and hard to debug characterization test failures. The implementation of algorithms to determine characteristics of WBG devices varies with each vendor leading to more dilemma. With new reference board designs the dynamic characterisation using standard definition will not suffice. The talk encompasses oscilloscope and software utilisation to accurately characterise WBG devices during the above issues. The software helps in determination of switching parameters and body diode recovery parameters on ringing waveforms. With flexible analysis software, WBG devices can be tested beyond standard definition. This talk includes identification of appropriate current measuring methods according to application needs. De-skewing probes at higher voltage and current will be covered. The talk encompasses multiple pulse analysis and filtering noisy gate waveforms before characterisation.

Bio: Vivek Shivaram is a Product Owner for Power Solutions in Tektronix India focusing on fields such as renewable energy system, motor drive analysis, power rail analysis, and wide bandgap system testing. He has experience of five years in the field of power solutions design and development. He has major bachelor's degree in Electronics and Communications and minor degree in Computer Science. He has authored seven patents and three research papers. He is an active member of JEDEC JC-70 work group.

6 Aug 2024 | 12:00PM - 12:15PM

Industry Presenter

R. Jeyaraman
CE+T Power

Title: Implementing DC Microgrid Solutions with a Multidirectional Power Converter for The TRANSFO Community

Venue: Grand Ball Room

Abstract: The RE/SOURCED Project at Transfo, Zwevegem, is focused on implementing a medium-sized, self-sufficient energy system using renewable energy sources and advanced storage technologies. This includes the use of Stabiliti 30C3-CE converters, which offer multiport power conversion and high energy efficiency. The project aims to enhance grid stability and reliability by managing energy flow between renewable sources, the grid, and storage units, aligning with the Transfo community's sustainable and circular economy goals.

Bio: R. Jeyaraman (Jeyaraman Ramakrishnan) was born in Aruppukottai, Tamil Nadu, in 1982. He earned his B.E. in Electrical and Electronics Engineering from Madurai Kamaraj University, Madurai, India, in 2004 and his master's degree in Power Electronics from P.S.G. College of Technology, Coimbatore, India, in 2007. He is pursuing his PhD at the Sathyabama Institute of Science and Technology, Chennai, India. He is currently the Head of Hardware Development in the R&D division at CET Power Solutions India Pvt. Ltd. in Chennai. With 18 years of experience, he has worked on 15 different power ratings of telecommunication inverter products and launched them into the field. His research interests include power electronics and its applications, renewable energy systems, reliability, safety certification (CEBEC/UL), and EMC compliance.

6 Aug 2024 | 12:15PM - 12:30PM

Industry Presenter

Navaratan Katariya
Nasscom

Title: Co-Creation with Startups: The Need of the Hour

Venue: Grand Ball Room

Abstract: Co-creation with startups is essential for innovation in today's dynamic market. This presentation explores the mutual benefits of corporate-startup collaboration, emphasizing the role of deep-tech like AI and ML in power electronics. Attendees will gain insights into successful models, overcoming challenges, and strategic implementation, fostering innovation and achieving competitive advantage through effective co-creation strategies.

Bio: Navratan Katariya has an experience of setting up 14 new businesses for companies he worked for and 2 of his own, over 3 plus decades. Domains have been renewable energy and engineering. He started and led the solar business of the largest solar construction and then the largest module manufacturing companies in India. He also spent almost a decade in IT industry, working with California based large enterprises. He is now a Director, Startup engagement, Innovation and International partnerships at Centre of Excellence IoT & AI, NASSCOM, Bangalore in areas of deeptech used in Agritech, Cleantech, Healthcare, Mobility/transport, Industry Automation, smart city etc. Navratan is an electrical engineer, Masters in cleantech/energy systems from IIT Mumbai and MBA from The Netherlands. He loves to travel, spends time for conflict management, social impact areas and mentors startup founders. He introduced the concept of carpooling in June 2000 in Bangalore and ran a not-for-profit online carpool Bangalore group.

6 Aug 2024 | 12:30PM - 12:45PM

Industry Presenter

Valmik Suryavanshi
Phoenix Contact India Pvt Ltd

Title: Power to X - Carbon Neutral future with Green Hydroigen

Venue: Grand Ball Room

Abstract: Power 2X - Working together to create a carbon-neutral future with green hydrogen.
Empowering the All-Electric Society: The All-Electric Society describes a world in which renewable energy is available worldwide as the primary type of energy in sufficient quantities and in an entirely economical way. This is based on the comprehensive electrification, networking, and automation of all sectors of the economy and infrastructure. With our expertise in products, solutions, and digitalization, Phoenix Contact is empowering industry and society to forge ahead with this transformation as we move toward a sustainable world.

Bio: 21+ Years of Industrial Automation experience out of which 8 years in Business development and 13 years in Engineering. Supported versatile application and Industries like Process, Marine, Smart City (Water Distribution) Smart Grid (Power Distribution) etc..), Renewable Energy (Cloud, AI Monitoring), Automotive (IIoT / Industry 4.0).

6 Aug 2024 | 12:45PM - 01:00PM

Industry Presenter

Rahul Lodhi
Phoenix Contact India Pvt Ltd

Title: Fast Charging Infrastructure for Electric Vehicles

Venue: Grand Ball Room

Abstract: Fast charging infrastructure for electric vehicle – Electric vehicle DC fast charging are critical for the widespread adoption for EV's addressing the need for rapid and efficient energy replenishment. These system utilize direct current (DC) to deliver high power levels and significantly reducing charging time compared to alternating current (AC) charging. The key technologies include high-power chargers with output ranging from 50 kW to 350 kw and more..., enabling Evs to gain substantial range with in 10-30 min.

Bio: TBD

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 12:00PM - 12:15PM

Industry Presenter

Niranjan R Hegde
Tektronix India Pvt. Ltd.

Title: Challenges and Solutions for dynamic validation of Wide Bandgap designs with Oscilloscope solutions

Venue: Grand Ball Room

Abstract: Typical signal transmission issues are attenuation, reflection, dispersion, insertion loss, interference, and crosstalk. The received signal through the channel will have different characteristics than the transmitted signal. An eye diagram is an analysis tool that gives insight into the amplitude and timing behavior of the signal. The idea of maintaining signal characteristics until it reaches a receiver with acceptable signal quality and timing margin is called Signal Integrity (SI). The power distribution network (PDN) in high-speed systems faces fluctuations known as Power Supply Noise (PSN). These fluctuations result from factors like cross talk, ground bounce, non-ideal impedance, and Simultaneous Switching Noise (SSN). Maintaining jitter, circuit logic, power supply rejection ratio (PSRR), and noise margins within tolerance limits can be challenging due to PSN. SSN arises from multiple buffers switching rapidly, affecting voltage variation through inductance in the PDN and potentially impacting signal integrity. Power supply induced jitter (PSIJ) is the undesired deviation in signal timing caused by above mentioned noise types. This can lead to poor Signal Quality. This session introduces PSIJ, discusses the causes, and introduces an intuitive tool for post silicon validation. To analyze PSIJ, a notch filtering on FFT of the signal and its reconstruction may not be enough in reducing the jitter components as the signal gets impacted at multiple frequencies. This means that a solution which filters the TIE spectrum and reconstructs the signal becomes necessary. With the help of TIE Spectrum filtering, power supply noise component can be suppressed and the integrity of the recreated HSS can be validated.

Bio: Mr. Niranjan Hegde is working in Tektronix as a software design engineer from last 7 years with primary focus on power technologies. He is an active member of JEDEC JC-70 workgroup. He received his Bachelor's in E&E Engineering from VTU, and Master's in Software Systems from BITS Pilani.

7 Aug 2024 | 12:15PM - 12:30PM

Industry Presenter

Preetam Tadeparthy
C2i Semiconductors Pvt Ltd

Title: Co-Creation with Startups: The Need of the Hour

Venue: Grand Ball Room

Abstract: 22% of the energy is lost even before it reaches its destination to enable processing and about a 3rd of the energy in the data centers is consumed to keep the system cool enough to ensure the solution performs at its best. High power consumption of today's AI is pushing limits in every possible way. Simply delivering these power levels is just not enough. It has to be done in the most power and thermally efficient way and be done at a cost and power density that is exponentially reducing. Every bit of power lost has to be managed for thermals further increasing the cost for cooling and poor carbon footprint. The talk outlines a multi-faceted problem and research opportunity. It will be extremely clear that technological advancement just in the semiconductor process to enable GaN to replace Si MOS etc will alone not not be enough to support the exponential growth. Process technology has to be coupled with new IP technology and packaging technology that enable co-design and create a solution that will continuously support growing power needs. We will talk about some semiconductor process advancement, newer topologies and requirements and how package technology is evolving to meet the electrical and thermal needs.

Bio: Preetam Tadeparthy an Expert system architect and chief technologist. His expertise and unique capability to marry the concepts from signal chain with power while combining his creative problem-solving skills and expertise in systems/architecture, IC design, process technology have resulted in breakthrough products. He is well-known in the Industry for his vast experience ranging from AFEs for Cable, WLAN, Digital control with ARM based SOC for high power multi-phase converters in server power and power management in general. He has over 70+ granted and 20 pending patents in USPTO and multiple international publications and an IEEE gold medal. He is a member of the Industry academic board in multiple institutions like IISc, DEI, Dayalbagh Agra & Sr Member IEEE. He is currently freelancing and working with young system startups to build the culture of systems down thinking into IC design along with teaching part time in DEI, Dayalbagh.

7 Aug 2024 | 12:30PM - 12:45PM

Industry Presenter

Kishor Narang
Narnix technolabs Pvt. ltd.

Title: Architectural and Systems Approach Imperatives for Digital Infrastructure

Venue: Grand Ball Room

Abstract: Today, Digital Infrastructures are being deployed in diverse domains. The diverse evolving infrastructure paradigms, be it grid, city, buildings, or manufacturing are comprehensively influenced and have been impacted by the emerging and cutting-edge technologies like IoT, DLT, AI, ML, Digital Twin, Quantum Technologies, 5G or 6G and Metaverse. These disruptive technologies along with bringing value to each ecosystem also bring fresh exponentially increasing cyber-threat landscape demanding a fresh, comprehensive, and granular understanding of the Civic/Critical infrastructure planning and design to make them Cyber resilient and immune. This is leading to the infrastructures becoming more complex in architecture and design. The talk shall delve into the challenges the System/Solution designers are facing today followed by presenting a structured systemic approach (A holistic, iterative, discovery process) that helps first defining the right problem in complex situations and then in finding elegant, well-designed and working solutions. It incorporates not only engineering, but also logical human and social aspects. The Architectural & Systems Approach proposed, if adopted by the diverse infrastructure deployers leveraging disruptive digital technologies be it Smart Cities, Smart Grid, or Smart Manufacturing etc. can drive comprehensive De-carbonization and Digitalization together, meeting current and future socio-techno-economic imperatives of the respective ecosystem stakeholders…

Bio: Kishor is Technology Advisor, Mentor, Design Strategist & Architect in Electrical, Electronics & ICT with over 47 years of professional experience in education, research, design and advisory running an Independent Design House – NARNIX since 1981. Over 37 years of hardcore Research and Design Development Experience in Solutions, Systems, Products, Hardware, Software & Firmware (Embedded Software) across diverse technology & application domains, and over 10 years of Strategic Advisory Experience to different segments of business & industry. He has over 400 Research & Design Mentees in the Electronics, ICT & STI (Science Technology & Innovation) Ecosystems. He is Member, Academic Council, D Y Patil International University, Pune; Research Advisor, Institute of Informatics and Communication, University of Delhi & Indira Gandhi Delhi Technical University for Women, Delhi; & Member, Academic Committee, Electronics & ICT Academy at National Institute of Technology, Patna.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 12:45PM - 01:00PM

Industry Presenter

PrithviRaj Narendra
Nunam Technologies India Pvt. Ltd.

Title: The need for 2nd life of EV Lithium batteries

Venue: Grand Ball Room

Abstract: The two major use cases for large capacity Lithium based batteries are in Electric Vehicles (EVs) and Energy Storage Systems (ESS). In both, the traditional approach is to use a new battery for its use case and at the end of it's usable life for the application it is sent for recycling. This is sub-optimal both from an economic as well as a carbon-footprint point of view. With Electric Vehicles, especially in the commercial use-cases, the majority of the return of investment of the vehicle is within the first 3-4 years as compared to an internal combustion engine vehicle. With appropriate grading, sorting and re-assembly technology, up to 70% of the cells or modules from Batteries from such an EVs can be repurposed for a 2nd life stationary storage application. This further reduces the total cost of ownership (TCO) of the vehicle owner, prompting in investing in new batteries for their existing vehicles. These 2nd life batteries with lower input cost for manufacturing is competitive in the ESS landscape with warranty provided in the range of 5 to 8 years with appropriate remote monitoring technology. There is a reduction in carbon footprint by ESS by being able store renewable energy and grid peak shaving, which is majority powered by coal in India. On top of this, a 2nd life pack provides additional carbon footprint saving by extending the life of the battery for another 5-8 years before actual recycling. This 2nd life battery ecosystem is notably of consideration in EV charging station, especially in highways, where high power grid connection might not be available, thus 2nd life batteries can provide the peak power requirements from energy stored from grid or solar.

Bio: PrithviRaj Narendra is an Embedded Systems Engineer at Nunam. Currently he is leading all the electronics and firmware activities at Nunam – making sure the 2nd life batteries deployed by Nunam are working optimally by remotely monitoring them and providing proactive customer service. Previously Prithvi had co-founded Appiko, with the goal to develop open source technology for wildlife conservation, especially in the area of human-wildlife conflict. Prior to Appiko, he has worked on multiple consumer electronics product both on electronics and firmware, with products reaching large scale manufacturing.

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

7 Aug 2024 | 04:00PM - 04:30PM

Industry Presenter

Will Holland
Analog Devices

Title: Powering the Reliable Transition to a Clean Energy Grid

Venue: Grand Ball Room

Abstract: What does the clean energy grid look like? It is a deeply interconnected ecosystem of energy producers, asset owners, utility service providers, governments, and consumers, all working together to provide and access energy. Distributed renewable sources, bi-directional flows, real-time grid healing capabilities, and seamless access to energy are the new realities of this 'largest machine on Earth'. The transition to a reliable, clean energy grid is complex. One approach is to simplify the paradigm into Energy Management, Energy Conversion and Energy Storage. And while doing so, we must move away from the simplistic model of making single-point decisions to multi-nodal precision sensing and generating concurrent system insights at the edge—processing, prioritizing, and communicating those insights—while preventing communications from becoming a failure mechanism. Facilitated by digitization and empowered by insights, the complex interplay between production and consumption becomes increasingly manageable and lowers the overall cost of energy.

Bio: Will Holland is Principle Technologist and leads the Energy Branch of the Advanced Technology Group within the Automotive Electrification and Sustainable Energy (AES) Business Unit at Analog Devices (ADI). Will holds a Master of Electronics Engineering from Edinburgh University and started his career as an Analog IC designer, working on image sensors at ST Microelectronics. He joined Gigle Semiconductors in 2006 (which was subsequently acquired by Broadcom) where he focussed on Gigabit Powerline Communication. In 2012 he joined Metroic, which was acquired by ADI, where he worked on self-monitoring electric metering. After 10 years of experience in metering and T&D products, and over 20 years overall in the semiconductor industry where he gathered experience in most areas of design as well as in product definition and system engineering, he is now bringing his deep technical expertise into the energy pillar of the AES advanced technologies group.

5 Aug 2024 | 03:00PM - 03:20PM

Sponsor Talk

Robin Roy
Delta Electronics

Title: Power Electronics applications and its trends DC and Telecom industry

Venue: Grand Ball Room

Abstract: The current trends in power and cooling infrastructure of large AI Data Centers. The power density has increased many fold due to deployment of GPU Servers, which calls for innovative solution of power backup, power distribution, the rack design housing these servers and the cooling required to manage the large power density seen in recent times. Cooling systems now deploy direct liquid cooling, air to liquid cooling, immersive cooling technologies. Power systems both AC and DC systems have to be more energy efficient and deploy some innovative ways to manage the peak demand of such data centers.

Bio: Robin Roy has a rich experience of 35+ years in the field power electronics, conditioning & automation. Having worked with industry leaders like Pfizer, Siemens, Tritronics, Autometers and Eaton in various fields of Field Service, Sales & Marketing, Design & Development, Application Engineering, Factory Operations and Product Management in the past. With a 360o view of business processes, currently responsible for addressing the industry challenges of power quality, harmonic mitigation and Data Centre power & cooling optimized solutions with Delta offerings.

5 Aug 2024 | 03:20PM - 03:40PM

Sponsor Talk

Manjula Girish
Delta Electronics

Title: Fast charging infrastructure for EV charging

Venue: Grand Ball Room

Abstract: The electric vehicle (EV) industry is not just about that – vehicles. "It's about reshaping how we think about future of our Mobility and our environment. The preference for DC Fast chargers over AC chargers is rapidly growing. According to reports, the global DC fast charging market is projected to grow at a CAGR of 27% between 2024 to 2030. As India speeds toward widespread EV adoption, aiming 30% of electric vehicle by 2030. The imperative need is to invest in accessible, affordable, and reliable EV charging infrastructure for scalable Demand. The discussion is an insight sharing the roadmap ahead , emphasizing collaboration, innovation, community engagement, and a supportive regulatory framework.

Bio: Manjula Girish A Dynamic, Result-oriented - Business Leader with overall 19 years of hands-on B2B Turnkey experience. An ambitious Business Driver for Optimal Results and Agile to Value-adds in a fast-paced Environment with progressive hands on Industry experience. An Electrical & Electronics Engineer with an Executive Management Program Certification from IIM Calcutta in sales and Marketing and Strategic Management Program from IIM Lucknow. Setting up operations from scratch & scaling it to a new level. With the exposure to the customer base in India, engagement across multiple industries with B2B exposure.

5 Aug 2024 | 03:40PM - 04:00PM

Sponsor Talk

Vivek Bhat
Delta Electronics

Title: Energy Storage for Better Infrastructure

Venue: Grand Ball Room

Abstract: Introduction to Energy Storage technologies and how they are revolutionizing our Energy Infrastructure, making it more efficient, resilient, and sustainable.

Bio: Mr. Vivek Bhat holds a master's degree in Automotive Embedded System Design and bring over 20 years of experience in New Product Development. His expertise covers a diverse array of products, from handheld devices to megawatt-range power converters. Throughout his career, he has made significant contributions to technology development, team building, and business management. Currently, he leads the Mega Watt Solutions Business Division at Delta Electronics India.

5 Aug 2024 | 04:00PM - 04:20PM

Sponsor Talk

Bibhu Prasad Nayak
Bosch Global Software Technologies Pvt Ltd

Title: Electric Vehicles and it's inherent complexity - A simulation perspective

Venue: Grand Ball Room

Abstract: As the demand for electric vehicles (EVs) continues to rise, there is an increasing need for frontloading simulation. However, the scope of EMC simulation in this area remains limited, creating a bottleneck in two key areas. Firstly, modeling the complex system of EV architecture presents a challenge, and secondly, accurately modeling the noise sources stemming from switches adds to the complexity. To effectively address the EMC issue, a comprehensive understanding of power electronics and EMC concepts is essential. Emphasis on the significance of these aspects and current approaches being used are discussed. In the context of EV products, the inclusion of PCBs, bus bars, transformers, passive filter components, and non-linear ICs and switches presents a unique set of challenges. While modeling the PCB and passive components is relatively straightforward, it may pose computational challenges due to the extensive computational requirements. Additionally, the presence of magnetic materials in the common mode chokes (CMCs) and transformers introduces further complexity, as the non-linear properties of the core materials impact the EMC simulation, which is based on small signal AC analysis. These challenges underscore the need for innovative solutions in EMC simulation for EVs. Each aspects of modeling and its challenges shall be discussed in the talk.

Bio: Bibhu Prasad Nayak has more than 18 years of experience in the automotive industry and space applications as an expert in EMI/EMC. His expertise in computational electromagnetics has been instrumental in developing EM software as part of SimYog Technology. At present, he is leading a team of RF and EMI/EMC simulation engineers to tackle EMC issues within Bosch. He has completed his Master's degree from IIT Kanpur followed by Ph.D. in Computational Electromagnetics from Indian Institute of Science.

2.4 Industry Session - 1 (6 August 2024)

S No	Description	Time	Speaker Name	Speaker Affiliation - Company
1	High Voltage Silicon Carbide: Enables an Omnidirectional Grid	11:30 to 11:45	Pradeep Kulkarni	Microchip Technology (India) Pvt. Ltd.
2	Challenges and Solutions for dynamic validation of Wide Bandgap designs with Oscilloscope solutions	11:45 to 12:00	Vivek Shivaram	Tektronix Inc
3	Implementing DC Microgrid Solutions with a Multidirectional Power Converter for The TRANSFO Community	12:00 to 12:15	R. Jeyaraman	CE + T Power
4	Co-Creation with Startups: The Need of the Hour	12:15 to 12:30	Navaratan Katariya	Nasscom
5	Power to X - Carbon Neutral future with Green Hydroigen	12:30 to 12:45	Valmik Suryavanshi	Phoenix Contact India Pvt Ltd
6	Fast Charging Infrastructure for Electric Vehicles	12:45 to 13:00	Rahul Lodhi	Phoenix Contact India Pvt Ltd

2.5 Industry Session - 2 (7 August 2024)

S No	Description	Time	Speaker Name	Speaker Affiliation - Company
1	Power- Singal Integrity interdependency -Understanding of Power Supply Inducted Jtter	12:00 to 12:15	Niranjan R Hegde	Tektronix India Pvt. Ltd.
2	Taming the exponential power demands of processing for AI and Data needs	12:15 to 12:30	Preetam Tadeparthy	C2i Semiconductors Pvt Ltd
3	Architectural and Systems Approach Imperatives for Digital Infrastructure	12:30 to 12:45	Kishor Narang	Narnix technolabs pvt. ltd.
4	The need for 2nd life of EV Lithium batteries	12:45 to 13:00	PrithviRaj Narendra	Nunam Technologies India Pvt. Ltd.

2.6 Sponsor Session (5 August 2024)

S No	Description	Time	Speaker Name	Speaker1 Affiliation - Company
1	Power Electronics applications and its trends DC and Telecom industry	15:00 to 15:20	Robin Roy	Delta Electronics
2	Fast charging infrastructure for EV charging	15:20 to 15:40	Manjula Girish	Delta Electronics
3	Energy Storage for Better Infrastructure	15:40 to 16:00	Vivek Bhat	Delta Electronics
4	Electric Vehicles and it's inherent complexity - A simulation perspective	16:00 to 16:20	Bibhu Prasad Nayak	Bosch Global Software Technologies Pvt Ltd

2.7 Oral Session

Oral Sessions Names	No of Papers
Energy Storage for Communication Systems	6
Infrastructure for Communication Systems	6
ICT Power Converter Operation	5
Control of ICT Power Systems	6
Critical Power Systems - I	6
Critical Power Systems - II	6
Resilient and Reliable Power Systems	6
Operations in Critical Mobility Applications	4
Converters for Traction Drives	4
Converters for EV Charging - I	6
Converters for EV Charging - II	6
WBG Devices in EVs	5
Power Supplies for ICT Applications	5
DC - DC Converters in ICT Applications	6
Analysis and Design of Passives and Devices	5
Distributed Energy Resources and Applications	5
AC - DC Converters and Power Quality	3
Multilevel and Matrix Converters	3
Other Topics in DC - DC Converters	4

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 1

Session Name: Energy Storage for Communication Systems

Session Chair: Peter Green

Session Date: 5th August

Session Time: 15:00 to 16:30

Session Room: Turquoise

Paper ID	Paper Title	Authors	Time
4	Analyzing Impact of Current Distribution on Parallel Connected Battery Packs in Telecom Applications	Shiromani Chandra (Reliance Power Electronics Limited)*; Praveen Kumar (Reliance Power Electronics Limited); Suman Basu (Reliance Power Electronics Limited)	1500 to 1515
125	Non-isolated Partial Power Processing Converter for Battery Energy Storage Systems	Jyothsna Reddy Vari (Indian Institute of Science); Siddhi Kadam (IISc); Aabid Ahmad Dar (Indian Institute of Science); Vishnu Mahadeva Iyer (Indian Institute of Science)*	1515 to 1530
18	An Interpolation based Synthetic Battery Data Generation Technique	Janamejaya Channegowda (LTTS)*; vageesh Maiya (BMSCE); Chaitanya L (BMS College of Engineering)	1530 to 1545
30	Machine Learning Based Battery SOC Estimation for Electric Vehicles	Namrata Narayan (Indian Institute of Technology, Mandi)*; Souvik Saha (Jalpaiguri Government Engineering College); Moumita Das (IIT Mandi)	1545 to 1600
154	Aging-aware equivalent circuit model for SOH estimation in lithium-ion batteries	Roberta Di Fonso (Aalborg University)*; Remus Teodorescu (Aalborg university); Pallavi Bharadwaj (IIT Gandhinagar)	1600 to 1615
170	Thermal Characterization of Current and Next-Generation Lithium-ion Battery for E-mobility Applications	Chandan Chetri (Ontario Tech University)*; Sheldon Williamson (Ontario Tech University)	1615 to 1630

IEEE INTELEC 2024 | Bengaluru, India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 2

Session Name: Infrastructure for Communication Systems

Session Chair: Abhijit Kshirsagar

Session Date: 5th August

Session Time: 15:00 to 16:30

Session Room: Grand Ball Room - 2

Paper ID	Paper Title	Authors	Time
43	Indoor Grounding of Data Centers to IEC30129 and TIA607D Standards	Rohit P Narayan (nVent)*	1500 to 1515
52	Proposal of a New Heat Sink Structure with Streamlined Pins and Verification of Cooling Performance	Hiroki Seto (Okayama University)*; Kazuhiro Umetani (Okayama University); Masataka Ishihara (Okayama University); Eiji Hiraki (Okayama University)	1515 to 1530
146	Non-isolated Single Inductor-Based Dual-Input Bidirectional DC-DC Converter with ZCS for Integrating Battery Stack	Kumaravel S (NIT Calicut)*; Dr. Ravishankar A N (Christ College of Engineering); Vemparala Seshagiri Rao (National Institute of Technology Calicut, Kerala); Nikhil K (NIT Calicut)	1530 to 1545
87	Communication Infrastructure Over Power Line between Power Converters and Central System	sanke Pandit (Vertiv Energy India Pvt. Ltd)*; Sainath Wakharadkar (Vertiv Energy Pvt Ltd)	1545 to 1600
100	Design Comparison and Experimental Investigations into Thermal Failure of High-Frequency Transformers in Isolated DC-DC Converters	P. Roja (Indian Institute of Science, Bangalore)*; Mohd Shadab Ansari (Indian Institute of Technology, Bombay); D Venkatramanan (IIT Bombay); Vinod John (Indian Institute of Science, Bangalore)	1600 to 1615
19	A Long Horizon Data Augmentation Technique to Produce Reliable Synthetic Battery Parameters	Janamejaya Channegowda (LTTS)*; vageesh maiya (BMSCE); Chaitanya L (BMS College of Engineering)	1615 to 1630

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 3

Session Name: ICT Power Converter Operation

Session Chair: Kumaravel

Session Date: 5th August

Session Time: 15:00 to 16:30

Session Room: Agate

Paper ID	Paper Title	Authors	Time
8	Impact of Deadband on a Three-Phase Three-Level NPC Inverter for Induction Motor Drive utilizing a Innovative Deadband Circuit	Hritik Kumar (Indian Institute of Technology Patna)*; DR.RANJAN KUMAR BEHERA (IIT-PATNA)	1500 to 1515
59	A Nonisolated Four-Port DC-DC Converter for Solar PV-Battery Integration in Bipolar Load Systems	SOURAV PRASAD (NITK Surathkal)*; Prajof P (NIT Surathkal); Arun Dominic D (National Institute of Technology Karnataka)	1515 to 1530
93	A Four-Port DC-DC Converter for Hybrid Integration of Fuel Cell-Solar PV with Bipolar DC Microgrid	SOURAV PRASAD (NITK Surathkal)*; Prajof P (NIT Surathkal); Arun Dominic D (National Institute of Technology Karnataka)	1530 to 1545
119	DC Bus Regulation and Suppression of Circulating Current in an Isolated DC Microgrid	Pragya Nand Singh (Indian Institute of Technology Bhubaneswar)*; Srinivas B Karanki (IIT Bhubaneswar); Ravi Ranjan (Indian Institute of Technology Bhubaneswar)	1545 to 1600
151	Analysis of Overvoltage Across Blanking Capacitor Due to Junction Capacitance of Sensing Diode in Desat Protection of SiC MOSFET	Kamisetti N V Prasad (Indian institute of science)*; Syed Shahjahan Ahmad (Indian Institute of Science); Gopalaratnam Narayanan (Indian Institute of Science)	1600 to 1615

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 4

Session Name: Control of ICT Power Systems

Session Chair: Pallavi Bharadwaj

Session Date: 5th August

Session Time: 15:00 to 16:30

Session Room: Jasper

Paper ID	Paper Title	Authors	Time
95	A Hybrid Model Predictive Controller for an Integrated Dual-DC Boost Converter	Ritam Chakraborty (IIT Bhubaneshwar)*; Amrit Gaurav Rath (IIT Bhubaneshwar); Olive Ray (Indian Institute of Technology Bhubaneswar); Kapil Jha (GE, Bangalore)	1500 to 1515
127	Development and Evaluation of Wireless Charging System for Intraoral Devices using Ultra-Small Receiving Coils	Hituki Aiba (National Institute of Technology, Ibaraki College); Kosuke Moriya (National Institute of Technology, Ibaraki College); Kyungmin Sung (National Institute of Technology, Ibaraki College)*	1515 to 1530
131	Model Reference Adaptive Control for Split DC-Link based Dual Active Bridge Converter	Bhoomika R S (Indian Institute of Technology Bhubaneswar)*; Srinivas B Karanki (IIT Bhubaneswar)	1530 to 1545
132	Control of Cascaded H Bridge & Series Resonant Dual Active Bridge (DC-DC) based Solid State Transformer under Unbalance Grid	Sourabh Chahar (Indian Institute of Technology Madras)*; Himanshu Patel (IIT Madras); Kamalesh Hatua (IIT MADRAS)	1545 to 1600
161	Unsymmetrical Fault Analysis of DFIG wind form using FO-PI controller with online Neural Tuning	Ritesh Dash (SoEEE, REVA University)*; Darsan I A (REVA University); Dayananda Reddy B (REVA University)	1600 to 1615
173	A Feedforward control methodology incorporating input and output voltage variations in Dual Active Bridge converter	Saichand Kasicheyanula (Delta electronics India Pvt. Ltd.)*; Rati Ranjan Behera (Delta Electronics India Pvt Limited); Harisyam P V (Indian Institute of Science); Kaushik Basu (IISc-Bangalore); Shashidhar Mathapati (Delta electronics India Pvt. Ltd.)	1615 to 1630

IEEE intelec®
2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 5

Session Name: Critical Power Systems - I

Session Chair: D Venkataramanan

Session Date: 5th August

Session Time: 16:30 to 18:00

Session Room: Torquise

Paper ID	Paper Title	Authors	Time
26	Challenges Posed by Renewable Energy Source Integration to Machine Learning based Power System Fault Diagnosis	Rachna Vaish (RGIPT); BHEEMAIAH CHIKONDRA (Rajiv Gandhi Institute of Petroleum Technology)*; Umakant Dhar Dwivedi (Rajiv Gandhi Institute of Petroleum Technology)	1630 to 1645
47	Microgrids for Base Stations: Increased Cellular Network Resiliency through Integration of Solar Energy and Virtual Energy Transfer	Andres Kwasinski (Rochester Institute of Technology)*; Alexis Kwasinski (University of Pittsburgh)	1645 to 1700
22	Reliability Consequence of using Optimal Gbit Flash Memory based PWM Inverters	dorin neacsu (Technical University of Iasi)*	1700 to 1715
35	A Fault-Tolerant Single-Phase Inverter using Redundant Leg	Priya Singh Bhakar (Indian Institute of Technology Ropar)*; Ankita Tripathi (Indian Institute of Technology Ropar); Kalaiselvi J (Indian Insitute of Technology Ropar)	1715 to 1730
36	DC Microgrids Enabled with Triple Active Bridge Converter for Remote Areas	Osamah Aljumah (North Carolina State University)*; Shrivatsal Sharma (NC State University); Shubham Dhiman (NC State University); Vasishta Burugula (NC State University); Subhashish Bhattacharya (NC State University)	1730 to 1745
70	Electrical Earthing Considerations when Designing BESS near Major Substation and nearby PV farms	Rohit P Narayan (nVent)*; Julien Brousseau (nVent); Smitha Harshavardhana (nVent)	1745 to 1800

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 6

Session Name: Critical Power Systems - II

Session Chair: Srinivas Bhaskar Karanki

Session Date: 5th August

Session Time: 16:30 to 18:00

Session Room: Grand Ball Room - 2

Paper ID	Paper Title	Authors	Time
44	Flexible Busbar Connections for Hight Current Density Applications	Rohit P Narayan (nVent)*; Julien Brousseau (nVent)	1630 to 1645
90	Sensitivity of Dynamic Mho Characteristic to PLL Parameters of Grid Following PV	Meenu Jayamohan (Indian Institute of Science, Bangalore)*; Sarasij Das (Indian Institute of Science); Marjan Popov (Delft University of Technology)	1645 to 1700
106	A Switched-sink Bidirectional Power Amplifier	Ramanuja Panigrahi (IIT Roorkee)*; Santanu Mishra (IIT Delhi)	1700 to 1715
120	A Case Study for Standalone Solar Power Modules with and without IOT devices in Rural Hospital Emergency Rooms located in Kaniyambadi	Renugadevi P (Vellore Institute of Technology); Sudha A (Vellore Institute of Technology)*; srimathi r ramasamy (VIT University)	1715 to 1730
180	PWM Inverter Based Active Filter for High Frequency AC Systems in Space Applications	Mohammed Tuhin Rana (University of Minnesota)*; Surjakanta Mazumder (Indian Institute of Science, Bengaluru); Murti Salapaka (University of Minnesota); Kaushik Basu (IISc-Bangalore)	1730 to 1745
83	Data Driven Digital Twins for Monitoring the Health and Performance of Converters	Yingpei Li (University of Houston)*; BHARAT BOHARA (University of Houston); Harish Krishnamoorthy (University of Houston); Jeevanand S (IIT Roorkee)	1745 to 1800

IEEE intelec®
2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 7

Session Name: Resilient and Reliable Power Systems

Session Chair: Ashiq Muhammed

Session Date: 5th August

Session Time: 16:30 to 18:00

Session Room: Agate

Paper ID	Paper Title	Authors	Time
159	Design to Improve Performance in Two-Stage 48-to-1V Architecture for Server Power Supply	Prantik Majumder (Indian Institute of Technology Kharagpur)*; Santanu Kapat (Indian Institute of Technology Kharagpur); Debaprasad Kastha (Indian Institute of Technology Kharagpur)	1630 to 1645
50	Comparison of Availability and Resiliency Planning for Critical Loads	Alexis Kwasinski (University of Pittsburgh)*	1645 to 1700
51	Compact and Modular Power Units for Remotely Operated Vehicles	Rahul Raj (University of Houston)*; Harish S Krishnamoorthy (University of Houston)	1700 to 1715
56	A Fault-Tolerant Multilevel Inverter Topology with Three Source Configuration Using Lower Number of Switches	Marif Daula Siddique (National University of Singapore); Prasanth Sundararajan (National University of Singapore)*; Mrutyunjaya Sahani (National University of Singapore); Dharani Kolantla (National University of Singapore); Rahul Bhujade (National University of Singapore); Sanjib Panda (National University of Singapore)	1715 to 1730
57	Design and Validation of Fault-Tolerant Boost Inverter Topology	Marif Daula Siddique (National University of Singapore); Prasanth Sundararajan (National University of Singapore)*; Mrutyunjaya Sahani (National University of Singapore); Rahul Bhujade (National University of Singapore); Dharani Kolantla (National University of Singapore); Sanjib Panda (National University of Singapore)	1730 to 1745
135	Open Circuit Fault-diagnosis and Fault-tolerant Operation of ANPC	Dhruv M Kachhiya (IIT Bombay)*	1745 to 1800

IEEE intelec®
2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 8

Session Name: Operations in Critical Mobility Applications

Session Chair: Prasun Mishra

Session Date: 5th August

Session Time: 16:30 to 18:00

Session Room: Jasper

Paper ID	Paper Title	Authors	Time
72	A Highly Efficient Wide Battery Voltage Range Dual Active Bridge-based Single-stage Bidirectional EV Onboard Charger Without Low-Frequency Harmonics in the Charging Current	Soumya Ghorai (Indian Institute of Technology Kharagpur)*; Souvik Chatopadhyay (IIT Kharagpur)	1630 to 1645
157	Multi-winding Transformer based CLLC Current Mismatch Mitigation using Inter-bridge Phase Shift Modulation	Shubham Mungekar (Arizona State University); AYAN MALLIK (Arizona State University)*	1645 to 1700
166	PSAM and TM Based Fault Tolerant Scheme for Open Switch Faults in Dual Active Bridge Converters	Pradyumn Chaturvedi (Visvesvaraya National Institute of Technology, Nagpur)*; Harish R Bhawane (VNIT, Nagpur); Saurabh P Kamble (VNIT)	1700 to 1715
184	Design of Three-phase Multi-winding Transformer of High-Frequency AC Power Distribution Architecture for Space Application	Surjakanta Mazumder (Indian Institute of Science, Bengaluru)*; Naresh Rana (Indian Institute of Science, Bengaluru); Prasad Enjeti (Texas A&M University); Kaushik Basu (IISc-Bangalore)	1715 to 1730

IEEE intelec®
2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 9

Session Name: Converters for Traction Drives

Session Chair: Pallavi Bharadwaj

Session Date: 6th August

Session Time: 16:30 to 18:00

Session Room: Agate

Paper ID	Paper Title	Authors	Time
25	Multi-switch Fault Diagnosis for the Voltage Source Inverter fed Multi-phase Motor Drives based on Machine Learning	BHEEMAIAH CHIKONDRA (Rajiv Gandhi Institute of Petroleum Technology)*; Rachna Vaish (RGIPT); Umakant Dhar Dwivedi (Rajiv Gandhi Institute of Petroleum Technology)	1630 to 1645
29	Active Flux-based Torque Compensation Method of Permanent Magnet Synchronous Motors for Traction Application	Niraj D Muley (Varroc Engineering Ltd.)*; Gourab Ghosh (Varroc Engineering Limited); Anchal Saxena (Varroc Engineering Limited)	1645 to 1700
66	Dual Output Five-Level Inverter with Reduced Switch Count	Prashant Kumar (Indian Institute of Technology (BHU) Varanasi); Dhawal Dwivedi (Indian Institute of Technology (BHU) Varanasi)*; Chinmaya K A (Indian Institute of Technology (BHU) Varanasi)	1700 to 1715
124	An Improved Fundamental Current Estimation Algorithm for Traction Drives in Overmodulation Zone	Kuldip Patel (Indian Institute of Technology, Madras)*; Pratyush Pandey (Indian Institute of Technology, Madras); Harikrishnan P (IIT madras); Kamalesh Hatua (IIT MADRAS)	1715 to 1730

IEEE INTELEC®
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 10

Session Name: Converters for EV Charging - I

Session Chair: Abhijit Kshirsagar

Session Date: 6th August

Session Time: 15:00 to 16:30

Session Room: Grand Ball Room - 1

Paper ID	Paper Title	Authors	Time
53	Universal Modulation Technique for Quasi-Hybrid Input based Dual-Active-Bridge Converter for Bidirectional V2G Applications	Priyatosh Jena (Indian Institute of Technology (BHU))*; Rajeev Kumar Singh (IIT(BHU) Varanasi); Dr. V. N Lal (Dept of Electrical Engineering, IIT (BHU) Varanasi)	1500 to 1515
54	Deep Deterministic Policy Gradient Data-Driven Approach for EV Charging and Discharging Scheduling Problem	Sulaiman B Alabbas (University of Pittsburgh)*; Alexis Kwasinski (University of Pittsburgh)	1515 to 1530
68	An Isolated Multi Active Bridge Type Soft Switched AC-DC Boost PFC Converter	Himanshu Bhusan Sandhibigraha (Indian Institute of Science, Bengaluru)*; Vishnu Mahadeva Iyer (Indian Institute of Science)	1530 to 1545
214	Non Conductive Gun for Electric Vehicle Charging	Vrundesh S Pawde (VNIT, Nagpur) Suman Saurav (VNIT Nagpur) Ritesh Kumar Keshri (Visvesvaraya National Institute of Technology, Nagpur)	1545 to 1600
69	Component Stress Minimization of Resonant DC/DC Converter Using Fractional Power Processing for Battery Charging	WARDA MATIN KHAN (Indian Institute of Technology BHU, Varanasi)*; Rajeev Kumar Singh (IIT(BHU) Varanasi); Ranjit Mahanty (IIT(BHU)); Dr. V. N Lal (Dept of Electrical Engineering, IIT (BHU) Varanasi)	1600 to 1615
73	Extended High Efficiency Operation of Semi-Active Half-Bridge DC-DC Converter	Nachiketa Deshmukh (IIT Kanpur)*; Kamran Asad (Varroc Engineering Pvt. Ltd.); Mayank Deo (Varroc Engineering Pvt. Ltd.); Pramod Chaudhary (Varroc Engineering Limited); Siva Prabhakar (IIT Bombay); Shiladri Chakraborty (IIT Bombay); Sandeep Anand (Indian Institute of Technology Kanpur)	1615 to 1630

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 11

Session Name: Converters for EV Charging - II

Session Chair: Harish Krishnamoorthy

Session Date: 6th August

Session Time: 15:00 to 16:30

Session Room: Grand Ball Room - 2

Paper ID	Paper Title	Authors	Time
74	Diode Emulation Control for Efficiency Improvement of Dual Active Bridge Converters	Nachiketa Deshmukh (IIT Kanpur)*; Kamran Asad (Varroc Engineering Limited); Mayank Deo (Varroc Engineering Limited); Pramod Chaudhary (Varroc Engineering Limited); Siva Prabhakar (IIT Bombay); Shiladri Chakraborty (IIT Bombay); Sandeep Anand (Indian Institute of Technology Kanpur)	1500 to 1515
109	EV Charging Infrastructure: Smooth Power Delivery using Pulse Charging Methods for Swappable Charging Station	Devesh Kumar (Indian Institute of Technology Mandi)*; Moumita Das (IIT Mandi)	1515 to 1530
130	Analysis of Stray Capacitance Effects in Dynamics of LLC Converters under PFM for Battery Charging	Dipayan Chatterjee (IIT Kharagpur)*; Ranajay Mallik (STMicroelectronics Private Limited); Santanu Kapat (IIT Kharagpur); Indra Narayan Kar (IIT Delhi)	1530 to 1545
134	Comparison of Current Control Techniques for Single-Phase Integrated On-Board Chargers	Debarati Dam (IIT Delhi)*; Saptarshi Basak (IIT Delhi)	1545 to 1600
212	Performance of a Doubly Excited Cylindrical Rotor Brushless Synchronous Generator	Lokenath Chakraborty (Indian Institute of Technology Kharagpur)* Debranjan Mukherjee (Indian Institute of Technology Kharagpur) Chandan Chakraborty (IIT KHARAGPUR)	1600 to 1615
156	A New Integrated Onboard Battery Charger For Electric Scooters	Peng-Hao Huang (Texas A&M University)*; Abhay Gupta (Indian Institute of Science Bangalore); Naresh Rana (Indian Institute of Science, Bengaluru); Kaushik Basu (IISc-Bangalore); Prasad Enjeti (Texas A&M University)	1615 to 1630

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 12

Session Name: WBG Devices in EVs

Session Chair: Shiladri Chakraborty

Session Date: 6th August

Session Time: 15:00 to 16:30

Session Room: Turquoise

Paper ID	Paper Title	Authors	Time
102	A Detailed Experimental Switching Transient Performance Comparison of Normally-off GaN HEMTs	Manish Mandal (Indian Institute of Science Bangalore)*; Bharath Kumar M (Indian Institute of Science Bangalore); Malingu G (Indian Institute of Science Bangalore); Shamibrota Kishore Roy (Indian Institute of Science Banaglore); Kaushik Basu (IISc-Bangalore)	1500 to 1515
138	Optimal Design of a GaN-based high-efficiency Dual Active Bridge Converter	Shamibrota Kishore Roy (Delta Electronics India Private Limited); AISHWARYA B (Delta Electronics India Pvt Ltd)*; Ravali N (Delta Electronics India Pvt Ltd); Venkatesh AP (Delta Electronics); Sreehari Venugopal (Delta Electronics); CY LIN (Delta Electronics); Yingfan CHEN (Delta Electronics); Leon Li (Delta Electronics); Shashidhar Mathapati (Delta Electronics); Taha MS (Delta Electronics)	1515 to 1530
139	LC Type dv/dt Filter Design with Clamping Diodes for SiC MOSFET-based Motor Drives	Sai Prasanna Challa (Indian Institute of Science); Vishnu Mahadeva Iyer (Indian Institute of Science)*	1530 to 1545
144	GaN Device Modelling using Machine Learning Approach for Power Electronic Converters	Priyabrata Mondal (Indian Institute of Technology, Mandi)*; Souvik Saha (Jalpaiguri Government Engineering College); Moumita Das (IIT Mandi)	1545 to 1600
149	Comparison of Single-Phase GaN HEMT-based PFC Topologies for Onboard EV Chargers	Manish Mandal (Indian Institute of Science Bangalore)*; Shamibrota Kishore Roy (Indian Institute of Science, Bangalore); Bharath Kumar M (Indian Institute of Science, Bangalore); Malingu G (Indian Institute of Science, Bangalore); Mayank Shrivastava (mayank@iisc.ac.in); Kaushik Basu (IISc-Bangalore)	1600 to 1615

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 13

Session Name: Power Supplies for ICT Applications

Session Chair: Avik Bhattacharya

Session Date: 6th August

Session Time: 15:00 to 16:30

Session Room: Agate

Paper ID	Paper Title	Authors	Time
41	Non-isolated Interleaved High Step-down DC-DC Converter with Reduced Switched Capacitor Stages and Automatic Current Sharing	Kazuhiro Umetani (Okayama University)*; Fumie Ishitani (Okayama University); Taira Shirahase (Okayama University); Masataka Ishihara (Okayama University); Eiji Hiraki (Okayama University)	1500 to 1515
88	High Efficient, High Power Intensive DC – DC Converter solution for 5G telecom	Viresh Ashok Botre (Vertiv Energy Pvt. Ltd)*; Raviraj Sumbe (Vertiv Energy Pvt. Ltd)	1515 to 1530
45	A PSIM-based Tool for Quick Failure Rate Estimation for a DC/DC Converter	Dan Butnicu (Technical University of Iasi); dorin neacsu (Technical University of Iasi)*	1530 to 1545
164	Analysis and Design for Current Balancing in Interleaved LLC Converters for Two-Stage DCX 48-to-1V Telecom Power Supply	Faraz Ahmad (IIT Kharagpur)*; Santanu Kapat (IIT Kharagpur)	1545 to 1600
178	Secondary side-controlled fly-back converter for USB PD Charger application	Milind Dighrasker (Infineon Technologies)*; Jeevan Thomas (infineon); Kavan Gangadhar Acharya (Infineon Technologies); Rajarajan Rajendran (Infineon technologies)	1600 to 1615

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 14

Session Name: DC - DC Converters in ICT Applications

Session Chair: Pradyumn Chaturvedi

Session Date: 6th August

Session Time: 15:00 to 16:30

Session Room: Jasper

Paper ID	Paper Title	Authors	Time
27	A Nonisolated Enhanced Voltage Gain Dual Input DC-DC Converter with Symmetrical Bipolar Output	SOURAV PRASAD (NITK Surathkal)*; Prajof P (NIT Surathkal); Arun Dominic D (National Institute of Technology Karnataka)	1500 to 1515
34	High Power Density HV DCDC Converter for Aerospace	Durgaprasad Valluri (Collins Aerospace)*; Rupan Sarkar (Collins Aerospace); Nartu Santosh (Collins Aerospace)	1515 to 1530
94	A Non-Isolated Modified Quadratic DC-DC Boost Converter in a Stacked Configuration with Reduced Switch Voltage Stress	SOHAM CHAKRABORTY (IIT Kharagpur)*; PRASUN MISHRA (IIT Kharagpur)	1530 to 1545
99	A Review of High-Voltage High-Step Down Isolated Converter Topologies	Debjit Rana (IITD)*; Sonam Acharya (IITD); Santanu Mishra (IIT Delhi); Anil Suresh (AESI); Sreejakumar Nair (AESI)	1545 to 1600
101	A Dual Input Bipolar Symmetrical Output DC-DC Converter with Improved Voltage Gain	SOURAV PRASAD (NITK Surathkal)*; Prajof P (NIT Surathkal); Arun Dominic D (National Institute of Technology Karnataka)	1600 to 1615
121	Accurate Efficiency Estimation of DC/DC Converters using Automatic Temperature Calibration	Somenath Banerjee (Indian Institute of Technology, Delhi)*; Santanu Mishra (IIT Delhi); Priyabrata Shaw (Eaton India Innovation Center (EIIC)); Ambuj Sharma (EATON India Innovation Center (EIIC))	1615 to 1630

IEEE INTELEC 2024 | Bengaluru, India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 15

Session Name: Analysis and Design of Passives and Devices

Session Chair: Soumya Shubhra Nag

Session Date: 6th August

Session Time: 16:30 to 18:00

Session Room: Grand Ball Room - 1

Paper ID	Paper Title	Authors	Time
49	Frequency- and Time-Domain-Based Methods to Estimate Parasitic Capacitances in Planar Magnetics using Terminal Measurements	Ashiq Muhammed (National Institute of Technology, Calicut)*; Ambadi Vinayak (Natioanl Institute of Technology, Calicut); Vinod John (Indian Institute of Science, Bangalore)	1630 to 1645
84	On MATLAB-based Stability Analysis of Discrete Differential Capacitor Voltage Feedback for Active Damping of LCL Filters	Durga Nair S (Delta Electronics India)*	1645 to 1700
97	1 MHz Isolation Transformer Design, Using the Core Geometry Approach	Pedram Chavoshipour Heris (University of Arkansas)*; H. Alan Mantooth (University of Arkansas)	1700 to 1715
103	Generalized Analytical Modeling for Switching Loss Estimation of SiC MOSFET at Wide Operating Range	Adarsh Dubey (IIT Roorkee); Apurv Kumar Yadav (Indian Institute of Technology, Roorkee)*	1715 to 1730
104	Dynamic Voltage Balancing of Series Connected GaN Devices for Higher Voltage Application	Siddhartha Suyal (Indian Institute of Technology Roorkee); Apurv Kumar Yadav (Indian Institute of Technology, Roorkee)*	1730 to 1745

IEEE INTELEC®
INTELEC 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 16

Session Name: Distributed Energy Resources and Applications

Session Chair: Peter Green

Session Date: 6th August

Session Time: 16:30 to 18:00

Session Room: Grand Ball Room - 2

Paper ID	Paper Title	Authors	Time
148	Size -- Efficiency Multi-Objective Design of DC-link Capacitor in Two-Stage Single-Phase Converters	Biswajit Sahoo (IIT Bombay)*; Shiladri Chakraborty (IIT Bombay)	1630 to 1645
62	Adaptive Model Predictive Control Applying on Two-Switch Forward Converter for the Application of High Voltage Battery Management System	Shiv Prakash (IIT BHU)*; Rangoli Singh (IIT BHU Varanasi); Aditya Kumar (IIT BHU); Sandip Ghosh (Indian Institute of Technology (BHU) Varanasi); Swami Naidu N K (IIT BHU)	1645 to 1700
67	A 300 VA Low-Cost Efficient Standalone Photovoltaic System for Rural Applications	Jenson Joseph C Attukadavil (IIT Bombay)*; Aniket Nadkarni (IIT Bombay); Baylon G. Fernandes (Indian Institute of Technology Bombay)	1700 to 1715
92	A Novel Three-Phase Quadruple Boost Switched Capacitor Multilevel Inverter for PV Applications	Dr. Vijay Kumar Singh (Rajiv Gandhi Institute of Petroleum Technology)*; BHEEMAIAH CHIKONDRA (Rajiv Gandhi Institute of Petroleum Technology)	1715 to 1730
122	Design and Analysis of a 6/4 Switched Reluctance Motor for Solar Water Pumping System	Suraj Kumar Chaurasiya (IIT Roorkee)*; Avik Bhattacharya (Indian Institute of Technology Roorkee); Sharmili Das (IIT Roorkee)	1730 to 1745

IEEE intelec®
intelec 2024 | Bengaluru,India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 17

Session Name: AC - DC Converters and Power Quality

Session Chair: Prasun Mishra

Session Date: 6th August

Session Time: 16:30 to 18:00

Session Room: Turquoise

Paper ID	Paper Title	Authors	Time
117	A Reconfigurable DC-Link Capacitor based AC-DC Converter with Multi-Function Controller for Versatile Loads	Priyatosh Jena (Indian Institute of Technology (BHU))*; Rajeev Kumar Singh (IIT(BHU) Varanasi); Dr. V. N Lal (Dept of Electrical Engineering, IIT (BHU) Varanasi)	1630 to 1645
158	Series Connected High Frequency Link Ripple Power Compensation Strategy for 1-phase Bidirectional Isolated AC-DC Matrix Converters	Subhranil Barman (IIT Bombay)*; Shiladri Chakraborty (IIT Bombay); Kishore Chatterjee (IIT Bombay)	1645 to 1700
163	Adaptive On-Time Average Current Control Tracking in Critical Conduction Mode Three-Level Boost PFC	Calvin Paul Joseph (IIT Kharagpur)*; Santanu Kapat (IIT Kharagpur); Ruturaj Garnayak (IIT Kharagpur)	1700 to 1715

Session 18

Session Name: Multilevel and Matrix Converters

Session Chair: Harish Krishnamoorthy

Session Date: 6th August

Session Time: 16:30 to 18:00

Session Room: Turquoise

Paper ID	Paper Title	Authors	Time
71	Quasi-Two-Level Switching for Active Balancing of Flying Capacitor Multilevel Converters Under Light-Load Conditions	Rahul K Iyer (UC Berkeley)*; Tahmid Mahbub (UC Berkeley); Robert Pilawa-Podgurski (UC Berkeley)	1715 to 1730
91	A Reduced Switching State PWM Single-Stage 3- Phase Matrix Inverter Without Device Voltage Spikes	Ravichandra Maddipudi (IIT kharagpur)*; Souvik Chatopadhyay (IIT Kharagpur)	1730 to 1745
160	A Simple Active Balancing Technique for 5-Level Flying Capacitor Converters with Reduced Sensing Requirements	Siddharth R Iyer (University of Colorado Boulder)*; Sayan Paul (University of Colorado Boulder); Dragan Maksimovic (University of Colorado Boulder); Luca Corradini (University of Colorado Boulder)	1740 to 1800

IEEE INTELEC 2024 | Bengaluru, India
4 - 7 August, 2024 | JW Marriott, Bengaluru, India

Session 19

Session Name: Other Topics in DC - DC Converters

Session Chair: Ashiq Muhammed

Session Date: 6th August

Session Time: 16:30 to 18:00

Session Room: Jasper

Paper ID	Paper Title	Authors	Time
126	A Unified Reduced Order Modeling and Dual Loop Frequency Control Design for CLLC Resonant Converter	Satyam Kumar (Indian Institute of Technology Madras)*; Kousik Ghosh (Indian Institute of Technology Madras); Kamalesh Hatua (IIT MADRAS)	1630 to 1645
143	Implementation of real-time digital control for phase shifted full-bridge rectifier using Texas Instrument's ARM Cortex-R5F core based MCU	Shamik Basak (Texas Instruments)*	1645 to 1700
155	Prediction and Mitigation of Common Mode Noise in a Four-Switch Buck-Boost Converter	Siddhi Kadam (IISc)*; Vishnu Mahadeva Iyer (Indian Institute of Science)	1700 to 1715
168	ZVS-Oriented Power Sharing Control in Modular DAB Converters connected in Input-Parallel Output-Parallel Configuration	Saikat Dey (Arizona State University); AYAN MALLIK (Arizona State University)*; Akin Akturk (CoolCAD Electronics)	1715 to 1730

intelec 2024 | Bengaluru, India

pels IEEE POWER ELECTRONICS SOCIETY Powering a Sustainable Future

IEEE Advancing Technology for Humanity

भारतीय विज्ञान संस्थान

www.intelec2024.org

Managed By

GHA CONFERENCES