MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

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A Report on

Guest Lecture on "Solar PV Integration: Hardware Design and Development"

Organized by

Department of EEE and MITS IEEE Student Chapter

20.09.2024

Chief Convener: Dr. AV Pavan Kumar, Professor and Head, Department of EEE, MITS.

Convener: Dr. Vineet Kumar, Assistant Professor, Department of EEE & Department IEEE/ISTE coordinator, MITS.

Resource Person/Speaker: Dr. Ajay Kumar, Assistant Professor, Electrical Engineering Department, PEC Chandigarh.

Attendees: 56 students & 5 faculty members

Venue: Seminar Hall **Time: 4:00 PM**

Background

On 20th September 2024, the Electrical and Electronics Engineering Department of MITS Madanapalle, in association with the IEEE Student Branch, successfully organized a guest lecture on "Solar PV Integration: Hardware Design and Development." The session was attended by many undergraduate students and faculty from the Electrical and Electronics Engineering (EEE) department. The aim of the lecture was to provide students and faculty with a deeper understanding of solar photovoltaic (PV) integration, focusing on the hardware design and development challenges involved.

The speaker for the event was Dr. Ajay Kumar, an accomplished Assistant Professor from PEC Chandigarh, with expertise in power electronics, renewable energy integration, and the control of microgrids. Dr. Ajay Kumar has made significant contributions to IEEE journals and conferences, and his research focuses on renewable energy integration, power converter design, and grid stability.

Speaker details

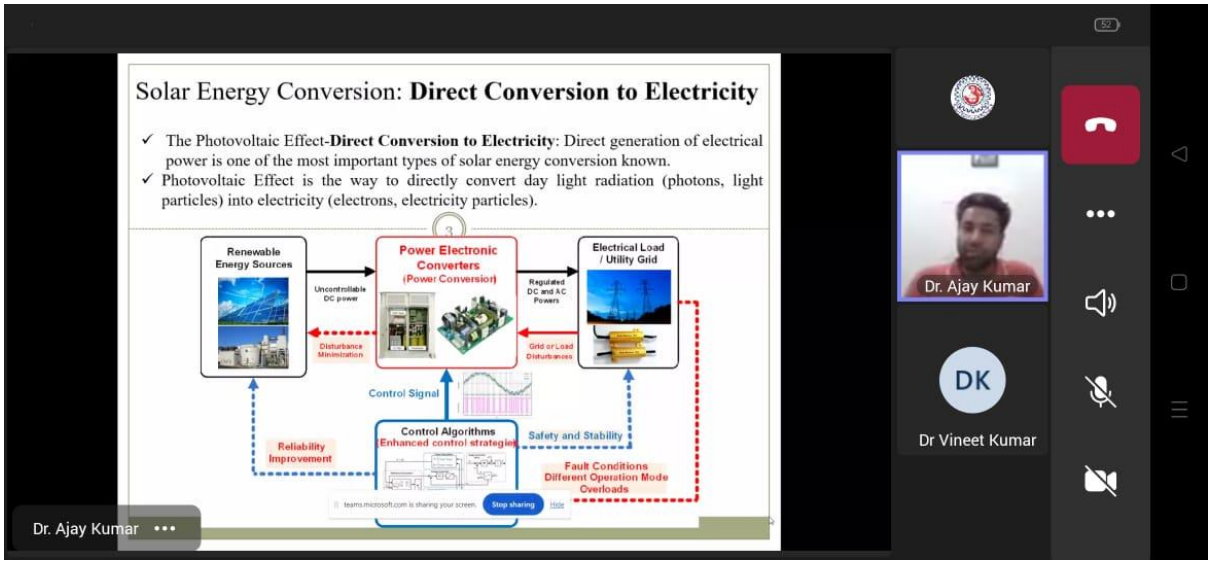
Name: Dr. Ajay Kumar

Designation: Assistant Professor, Electrical Engineering Department, PEC Chandigarh

Qualifications: Young Scientist (SERB), Ph.D. (MNIT Jaipur), M.Tech. (MNIT Jaipur), B.Tech. (Kurukshetra University)

Research Interests: Renewable Energy Integration, AC and DC Micro-grid Control, Power Converter Design, Energy Management, Power Quality Improvement

Expertise: Dr. Ajay Kumar is well-known in the academic and research community for his pioneering work in the integration of renewable energy into electrical grids and his extensive contributions to IEEE journals. He has extensive experience in power electronics and the challenges of incorporating renewable energy into modern power systems.



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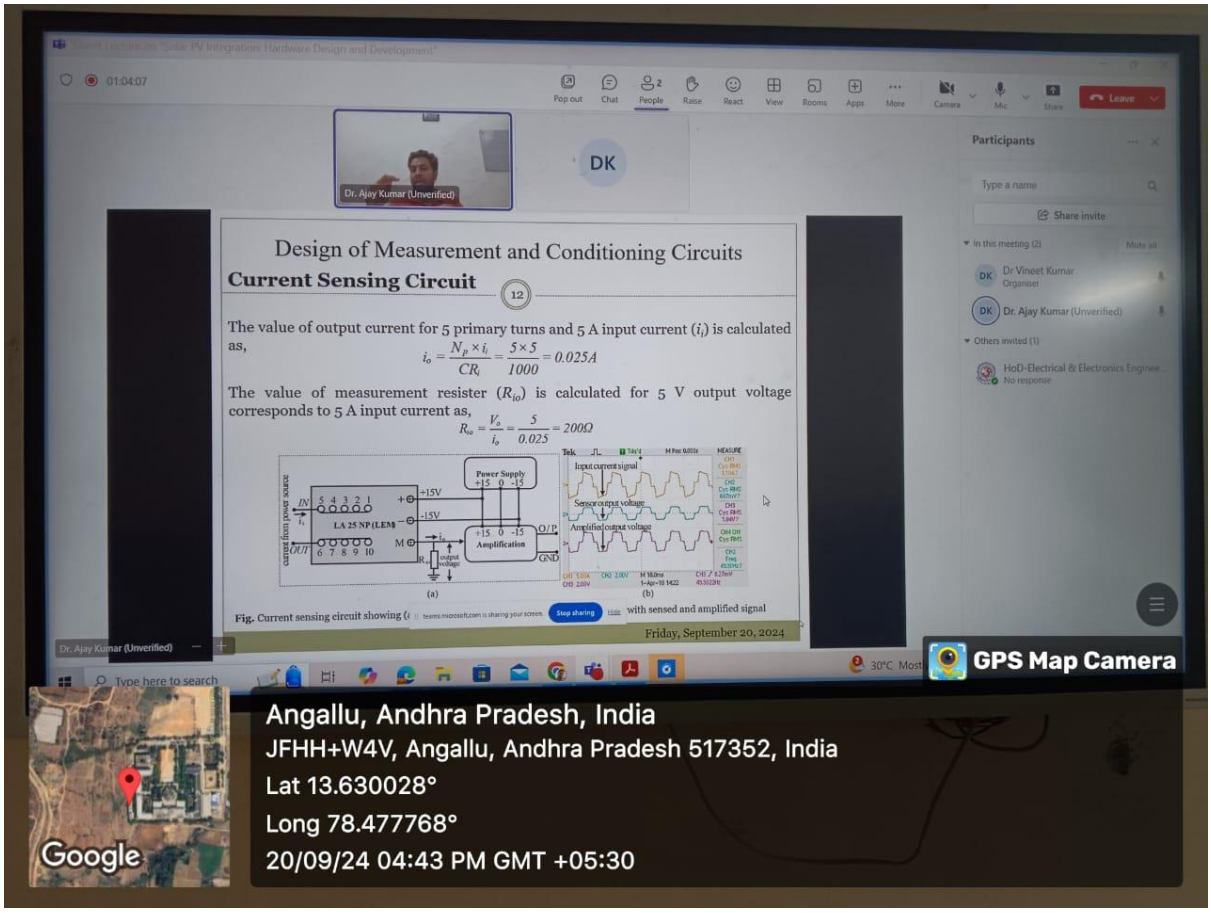
Detailed Summary of the Event

The event commenced with Dr. Vineet Kumar (Assistant Professor, EEE Dept., MITS Madanapalle) welcoming the audience and the esteemed speaker, Dr. Ajay Kumar. The welcome note was followed by a brief introduction of Dr. Ajay Kumar, highlighting his academic achievements, research expertise, and contributions to the field of solar PV integration and power electronics.

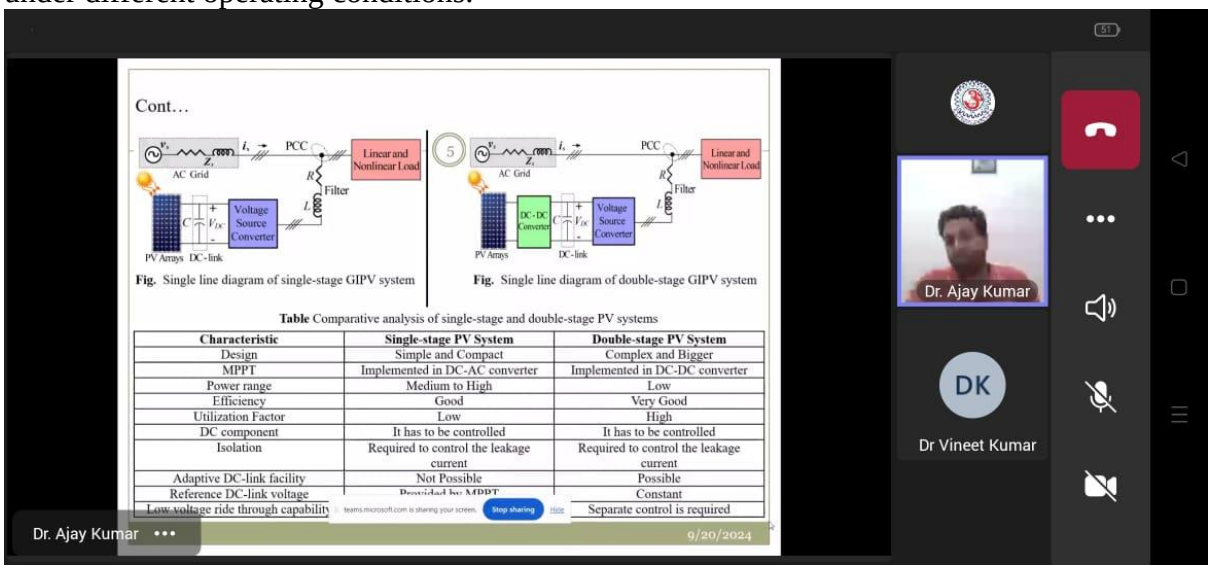
Dr. Ajay Kumar then took the stage and began his lecture by emphasizing the growing significance of solar PV as a clean and sustainable energy source. He outlined India's ambitious target of achieving 100 GW of solar energy capacity under the National Solar Mission and highlighted the global shift toward renewable energy technologies.



Dr. Ajay delved into the motivation and challenges associated with solar PV integration into the electrical grid. He discussed the intermittency of solar power generation, which arises from factors such as weather conditions and diurnal variations, posing challenges for consistent energy output. The discussion further expanded to the semiconductor-based converters that are used to connect solar energy systems to the grid, with a particular focus on their efficiency and security challenges when handling high levels of solar generation.

The speaker also elaborated on the solar energy conversion process and the methods for grid interfacing of solar systems. He provided insights into the technicalities of single-stage and double-stage PV systems, explaining how these systems function and the challenges involved in their design and operation.

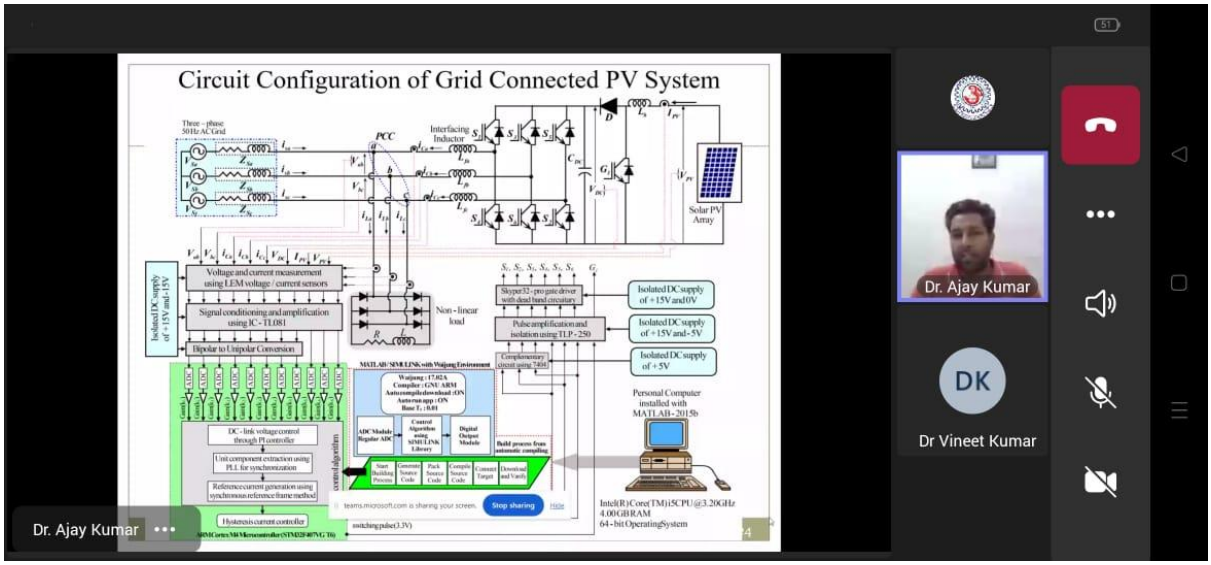
Dr. Ajay Kumar also covered the configuration of grid-connected PV systems and the associated modeling challenges. He explained how different control strategies can be employed to optimize the performance of solar PV systems while maintaining grid stability. He concluded the technical part of his lecture by presenting some case studies based on his research work, demonstrating various control configurations and hardware implementations of PV systems under different operating conditions.



At the end of the session, Dr. Vineet Kumar extended a heartfelt vote of thanks to all who contributed to the successful execution of the event. First and foremost, sincere thanks were given to Dr. Ajay Kumar, for his enlightening and informative lecture. His expertise in solar PV integration and hardware development provided the audience with valuable insights into real-world challenges and innovative solutions.

Dr. Vineet Kumar expressed gratitude to the *Head of the Electrical and Electronics Engineering Department, Dr. A.V. Pavan Kumar*, for his continuous guidance and support in

organizing such academic events. Furthermore, appreciation was extended to *Dr. Kumar C, the MITS IEEE coordinator*, for his efforts in coordinating the event under the banner of the IEEE student chapter. Special thanks were extended to the *Principal Sir, Dr. C. Yuvaraj* and the MITS management for their unwavering support and encouragement in organizing this event, which made it possible to enrich the academic experience of our students.
Finally, thanks were given to all the faculty members, students, and participants for their active involvement and enthusiasm, which contributed to making the event a great success.



Outcome of the Event

The guest lecture had a significant impact on the students and faculty, bridging multiple disciplines and providing insights into various aspects of solar PV integration and its role in modern energy systems. Key outcomes of the event include:
Enhanced Interdisciplinary Knowledge:
The lecture gave the audience a comprehensive understanding of the interaction between renewable energy technologies and power systems, showcasing how different fields such as materials science, electrical engineering, and control systems converge in solar PV integration.
Awareness of Sustainability and Clean Energy Solutions:
The session provided an in-depth discussion on the importance of solar energy as a sustainable solution to global energy challenges. It enhanced awareness of the national and global initiatives like the National Solar Mission and how they drive innovation in renewable energy systems.
Technical Insights on Grid Integration:
Dr. Ajay Kumar's detailed explanation of solar energy conversion, grid-connected systems, and associated control mechanisms deepened the understanding of the technological and operational challenges of integrating intermittent renewable energy sources with the electrical grid.
Inspiration for Research and Development:
The case studies and real-world examples shared by Dr. Ajay Kumar inspired participants to explore multidisciplinary research opportunities. These include energy management, grid stability, sustainable infrastructure, and advanced control techniques, opening pathways for innovation in renewable energy systems and integration methods.
By incorporating these multidisciplinary perspectives, the lecture provided a broader outlook on the evolving field of renewable energy integration and its impact on society.

The event was a great success, providing students with the opportunity to learn from an expert in the field of solar PV and renewable energy integration. It also strengthened the academic collaboration between the EEE Department of MITS Madanapalle and PEC Chandigarh.
The guest lecture on “Solar PV Integration: Hardware Design and Development” delivered by Dr. Ajay Kumar was a highly successful event that provided students and faculty members with valuable knowledge and insights. The collaboration between the EEE Department and the IEEE Student Branch at MITS Madanapalle was instrumental in making this event a success, and we look forward to organizing more such knowledge-sharing sessions in the future.

With regards,

Dr. Vineet Kumar
Assistant Professor, Department of EEE & Department IEEE/ISTE coordinator,
MITS, Madanapalle.