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Notice for the PhD Viva Voce Examination

Mr U Kamal Kumar, Registration Number: 1870097, PhD Scholar at the School of Engineering and Technology, CHRIST (Deemed to be University), will defend his PhD thesis at the public viva-voce examination on Tuesday, 22 September 2026, at 11.15 am in CDI Conference Room, III Floor, Block V, Bangalore Kengeri Campus, CHRIST (Deemed to be University), Bengaluru - 560074, Karnataka, India.

Title of the Thesis	:	**Optimal Allocation of Smart Photovoltaic Trees in Agriculture Feeders for Performance Improvement and to Reduce Grid Dependency**
Discipline	:	**Electrical and Electronics Engineering**
External Examiner - I	:	**Dr Mahipal Bukya** Associate Professor School of Electrical Engineering Manipal Academy of Higher Education (MAHE) Bengaluru - 560063 Karnataka
External Examiner - II	:	**Dr B L Narasimharaju** Professor Department of Electrical Engineering National Institute of Technology Warangal (NIT-W) Hanamkonda, Warangal - 506004 Telangana
Supervisor	:	**Dr Varaprasad Janamala** Associate Professor Department of Electrical and Electronics Engineering School of Engineering and Technology Bangalore Kengeri Campus CHRIST (Deemed to be University) Bengaluru - 560074 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva–voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 05 September 2026

ABSTRACT

This research develops an integrated smart renewable energy framework for improving the performance of agricultural distribution feeders. The study first investigates the characteristics of agricultural loads and develops realistic load models to represent the operational behaviour of irrigation and other voltage-sensitive agricultural applications. Based on these load characteristics, optimal sizing and placement of solar photovoltaic (PV) systems are carried out to reduce power losses, improve voltage profiles, and enhance renewable energy utilization. The study further incorporates coordinated reactive power compensation to address voltage fluctuations and improve the overall power quality of the distribution feeder. To overcome the land constraints associated with conventional ground-mounted PV installations, smart solar PV tree technology is integrated into the proposed agricultural feeder configuration. The developed framework is evaluated using standard IEEE radial distribution test systems and subsequently validated using a real-time agricultural distribution feeder in Andhra Pradesh, India. The proposed approach reduces dependence on conventional grid supply while providing a sustainable and land-efficient renewable energy solution for agricultural irrigation. Overall, the research establishes a practical framework for modernizing rural agricultural distribution networks and supporting reliable, economical, and sustainable renewable-energy-based irrigation systems.

Keywords: *Agricultural Distribution Feeders, Solar Photovoltaic Trees, Renewable Energy Integration, Feeder Optimization, Smart Agriculture, IoT-Based Energy Management.*

Publications:

1. **U. Kamal Kumar**, Varaprasad Janamala, "Enhancement of Agriculture Feeder Performance by Optimal Sizing and Placing of Solar PV Tree through AEO-Based Optimization Technique", International Journal of Electrical and Electronics Research (IJEER), 2023 Sep 23;11(3):781-7. https://doi.org/10.37391/ijeer.110322.
2. Varaprasad Janamala, **U. Kamal Kumar**, T. K. S. Pandraju, "Future search algorithm for optimal integration of distributed generation and electric vehicle fleets in radial distribution networks considering techno-environmental aspects", SN Applied Sciences, 2021. https://doi.org/10.1007/s42452-021-04466-y
3. **U. Kamal Kumar**, Varaprasad Janamala, "A Multi-Objective Artificial Eco-System Based Optimization Technique Integrating Solar Photovoltaic System in Distribution Network", IEEE TECCON, 2022. https://doi.org/10.1109/TEECCON54414.2022.9854838.
4. **U. Kamal Kumar**, Varaprasad Janamala, "Solar PV Tree Designed Smart Irrigation to Survive Agriculture in an Effective Methodology", IEEE SSTEPS, 2022. https://doi.org/10.1109/SSTEPS57475.2022.00016.
5. **U. Kamal Kumar**, Varaprasad Janamala, "Comparative Analysis of Load Flows and Voltage Depended Load Modeling Methods of Distribution Networks", Springer Book Series on Advances in Intelligent Systems and Computing, June 2021. https://doi.org/10.1007/978-981-33-6984-9_38.
6. **U. Kamal Kumar**, Varaprasad Janamala, "Artificial Ecosystem-Based Optimization for Optimal Location and Sizing of Solar Photovoltaic Distribution Generation in Agriculture Feeders", Springer Book Series, July 2022. https://doi.org/10.1007/978-981-16-9416-5_55.