

## **Special Session - International Conference on Smart Technologies for Smart Nations (IEEE SmartTechCon - 2023)**

- 1. Title of the special session:** Electric Vehicles Integration Influences on Power System Networks
- 2. Objective of the special session:** The rapid transition towards carbon neutrality required activities to be taken immediately and with great care to avoid any detrimental influence on the operation of various energy sectors and, as a result, on energy costs. In order to achieve the decarbonization goal, electrifying the transportation sector is a good first step. However, to enable the exponential growth of electric cars (EVs), installing fast and ultra-quick charging stations in certain locations will be necessary. The increasing number of EV charging loads, which are notoriously difficult to estimate due to their highly variable characteristics, creates technical hurdles and stressors for the power grid. In the meantime, if correctly managed, electric vehicle loads can be a wonderful remedy to address critical situations in power systems, boost flexibility demands, and contribute to the energy system. This is provided, however, that effective management of EV loads is carried out. In this context, in-depth and diverse assessments of EV employment need to be undertaken to assure a secure and cost-effective operation and planning of the power and energy system. It is vital to understand, among other things, the hosting capacity of the existing and future electricity network, developing charging

infrastructure, optimal location and control of EV chargers, EV-based flexibility analyses of the electricity network, the role of EVs under power system transient and steady-state situations, the impact of integrating EVs on power systems expansion planning, and addressing the uncertainties from different perspectives (including EV charging demand management).

Understanding all of these things is essential.

### 3. Topics of the special session:

Topics for this call for papers include but are not restricted to:

- EV flexibility provision
- EV hosting capacity, EV charging demand and behaviour and EV demand forecasting
- Energy prices and EV aggregator
- Virtual power plant concept for EV aggregation
- Fast and ultra-fast EV chargers
- Interdependence model of EMN and power system
- Optimal sizing and siting of EV chargers
- Transient studies of EV-penetrated power systems
- Power system operation and planning in the presence of EVs
- Operation of EVs in smart grids/smart homes: Vehicle-to-grid, vehicle-to-home, grid-to-vehicle
- Charging stations/systems for EVs: wired charging systems, wireless power transfer systems
- Power electronics-based solutions for plug-in hybrid electric vehicle energy storage and management systems
- Modelling, designing, controlling, and implementing a modified integrated PV/grid/EV DC charger/inverter, etc.

**4. Proposer full name and affiliation:**

Dr M. Premkumar

Associate Professor, Department of Electrical and Electronics Engineering,

Dayananda Sagar College of Engineering, Bengaluru, India