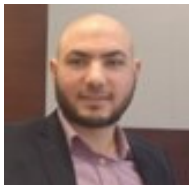
Grid Integration of EV Charging Infrastructure: Smart Charge Management (SCM) and Vehicle to Everything (V2X)

SPEAKERS



Ahmed Mohamed
Technology Manager for EV Charging Infrastructure at Eaton Research Labs

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About The Speakers:

Ahmed Mohamed:
Dr. Mohamed is a Technology Manager at Eaton Corporation, leading R&D for EV Charging Infrastructure. Previously, he was a Senior Researcher at the National Renewable Energy Laboratory (NREL) and an Adjunct Professor at the Colorado School of Mines.
He holds a Ph.D. in Electrical Engineering from Florida International University (FIU) and has nearly 15 years of experience in power electronics, EV charging, and DC distribution systems.
Dr. Mohamed has six U.S. patents/applications, five book chapters, and over 70 publications. A senior IEEE member, he serves as an associate editor for IEEE Transactions on Transportation Electrification and IET Power Electronics Journal. He was also Technical Chair and Publication Chair for the IEEE Greentech conferences in 2023 and 2021.
He received the Outstanding PhD Graduate Award from FIU in 2017.

Azrin Zulkefli:
Dr. Zulkefli, a Specialist Engineer at Eaton Corp., specializes in controls and optimization of dynamical systems. He earned his Ph.D. in Mechanical Engineering from the University of Minnesota in 2017. His work, funded by the U.S. Federal Highway Administration and Minnesota DOT, focused on optimal powertrain controllers for hybrid electric vehicles and hardware-in-the-loop testing for fuel and emissions evaluation. He later served as a Postdoctoral Associate before joining Eaton in 2018.
At Eaton, he develops controllers for power grid systems, distributed energy resources (DERs), and EV charging infrastructure to improve energy efficiency and resiliency. He has authored publications and holds patents in vehicular and grid control technologies.

ABSTRACT

The rapid adoption of electric vehicles (EVs) presents both opportunities and challenges for the power grid. This tutorial, "Grid Integration of EV Charging Infrastructure: Smart Charge Management (SCM) and Vehicle to Everything (V2X)," explores integrating EV charging with the grid, focusing on SCM and V2X technologies.
Smart Charge Management (SCM) optimizes EV charging to reduce peak demand and enhance grid stability. This tutorial covers SCM strategies like time-of-use pricing and demand response programs, helping utilities manage increased EV load and improve energy efficiency.
Vehicle to Everything (V2X) technology allows EVs to act as mobile energy storage units, including Vehicle-to-Grid (V2G), Vehicle-to-Home (V2H), and Vehicle-to-Building (V2B) interactions. The tutorial addresses the technical and regulatory frameworks for V2X, benefits like grid resilience, and challenges such as bi-directional power flow and cybersecurity.
Lessons from two projects provide practical insights: an AC V2G/V2H demonstration for residential applications with vehicle OEMs, utilities, and aggregators, and a DC-coupled fast charging site for medium and heavy-duty commercial EV fleets. These projects highlight stakeholder coordination, technical feasibility, and operational benefits.
Participants will gain a comprehensive understanding of EV grid integration, equipped with knowledge and tools to implement SCM and V2X solutions, fostering a resilient and sustainable energy ecosystem.