Talk Title – **Powering the Future: Innovations in Smart Battery Management, Advanced Charging, and Wireless Power Conversion for Electric Mobility**

Abstract: The future of electric mobility hinges on revolutionary advancements in several key technological areas. This keynote will explore the intersection of smart battery management systems, cutting-edge charging solutions, and advanced power electronic converters, offering a comprehensive view of how these innovations are driving the next generation of electric vehicles (EVs) and energy storage. At the core of this evolution are smart battery management systems (BMS), which play a crucial role in enhancing battery performance, safety, and lifespan. This talk will look into the latest developments in BMS technology, including real-time monitoring, predictive maintenance, and sophisticated thermal management strategies that ensure optimal battery operation and longevity.

The focus will then shift to advanced charging techniques, emphasizing both high-speed and wireless charging solutions. High-speed charging is pivotal for reducing EV downtime, while wireless charging represents a leap toward convenience and user-friendly experiences. Attendees will gain insights into the technical challenges and breakthroughs in these areas, including the latest standards in fast charging and the development of efficient, resonant inductive charging systems.

Finally, the keynote will address the role of advanced power electronic converters in managing energy flow and enhancing system efficiency. Innovations in power electronics, such as the use of silicon carbide (SiC) and gallium nitride (GaN) technologies, are transforming the landscape by improving power density, reducing losses, and enabling more efficient energy transfer. These advancements are critical for integrating renewable energy sources and optimizing the performance of electric mobility systems.

Biodata: Prof. Sheldon Williamson received the Ph.D. degree (Hons.) in electrical engineering from the Illinois Institute of Technology, Chicago, IL, USA, in 2006. He is currently a Professor with the Department of Electrical, Computer and Software Engineering, and the Director of the Smart Transportation Electrification and Energy Research (STEER) Group, within the Faculty of Engineering and Applied Sciences, at Ontario Tech University, in Oshawa, Ontario, Canada. His current research interests include advanced power electronics, electric energy storage systems, and motor drives for transportation electrification and autonomous e-mobility. Prof. Williamson is also an NSERC Canada Research Chair (CRC) in electric energy storage systems for transportation electrification and is a Fellow of the IEEE.