Research Title :	Design and Development of Smart Multiport EV Charging and Fleet Energy Management Platform for Public Sector Electric Mobility
Current TRL :	TRL – 3 (Concept validation, architecture defined, preliminary subsystem testing)
Target TRL (Post Project Completion) :	TRL – 7 (Field-deployable prototype validated in operational public fleet environment)
Abstract :	This project aims to design and develop a Smart Multiport EV Charging and Fleet Energy Management Platform tailored for public sector electric mobility applications, including government transport fleets, municipal service vehicles, utility departments, public health vehicles, police patrol EVs, and smart city mobility systems. The proposed system will consist of a modular multiport charging station capable of simultaneously charging multiple electric vehicles through AC and DC outputs with intelligent dynamic load sharing. The system will integrate adaptive power allocation algorithms to optimize energy utilization, reduce peak demand, and ensure grid-friendly operation across government depots and fleet yards. An embedded edge controller with IoT connectivity (4G/LTE/Ethernet/Wi-Fi) will enable real-time communication with a centralized cloud-based fleet energy management platform. The system will support OCPP-based interoperability for seamless integration with existing public charging infrastructure.

Key innovations include:	Dynamic load balancing across multiple charging ports Fleet-priority charging scheduling Depot-level peak demand management Battery health-aware charging optimization Predictive maintenance and remote diagnostics Energy analytics dashboard for public administrators Advanced protection mechanisms such as over-voltage, over-current, isolation monitoring, thermal management, and emergency shutdown systems will be incorporated to ensure safe and reliable deployment in public environments. The prototype will undergo laboratory validation, grid-load stress testing, and pilot deployment in selected government fleet depots to validate operational performance, energy savings, and system scalability.
Expected Outcome	The project will deliver: • A field-deployable smart multiport EV charging station prototype • Cloud-based fleet energy management dashboard • 25–35% improvement in depot energy optimization • 15–20% improvement in fleet charging turnaround efficiency • 20–30% reduction in infrastructure cost through indigenous development • Scalable architecture adaptable to Smart City and statewide EV programs