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Department/Centre:	DEPARTMENT OF ELECTRICAL ENGINEERING
Faculty:	FACULTY OF ENGINEERING AND TECHNOLOGY
Topic of Research:	Optimal Energy Management System of Smart Microgrids for Electric Vehicle Charging Stations

Keywords: *Hybrid Renewable Energy Resources, Energy Management System, Electric Vehicles, Optimal Control, Smart Microgrids.*

Findings

Nowadays power demands penetration is increasing day by day due to the global adaptation of Electric Vehicles (EVs). This research develops a load estimation model and EVs charging model under the various scenario of vehicle travelling patterns to predict their impacts on charging behavior. This research demonstrates a Markov Chain Monte Carlo (MCMC) based charging/discharging algorithm that efficiently deals with the prediction of EVs driving patterns. The dynamic control of Vehicle to Grid (V2G) power flow is associated with various issues such as unscheduled charging/discharging for xEVs integrated with Distributed energy generations (DEGs). The rapid growth of hybrid renewable DERs generation possess various challenges with inaccurate forecast models in stochastic power systems. The performance of online (dis)charging controllers that utilize DNN to act at its optimal power flow set of points for all sessions are examined in the details. The online RL controller results have been realized using real time hardware-in-the loop simulator. Further, the adaptive neuro based fuzzy control approach includes forecasting solar-based electricity generation and EVs loads demand predictions to optimize IEMS according to the Indian power scenario. The results are analyzed using a digital simulation model and validated with real time hardware-in-loop experimental setup.