

Hybrid Energy-Based Battery Storage Swapping Station for Electrical Vehicles and Net Metering in Bangladesh

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Extended Abstract

The Conventional EV charging techniques rely heavily on fossil fuels, which can hurt the environment and strain the grid, limiting access to charging. To facilitate widespread use of electric vehicles (EVs), a robust and dependable charging infrastructure is crucial. Local electrical systems are under pressure, prompting the use of cost-effective renewable energy sources such as solar power. This article intends to pioneer sustainable energy infrastructure and battery swapping stations for EVs using new methodologies. The proposal involves integrating photovoltaic (PV) panels, energy storage devices, and advanced net metering techniques to effectively gather and store solar energy on-site. This stored energy can subsequently be used not only to charge EVs batteries , but also to maintain grid stability via net metering, supporting a more sustainable and robust charging infrastructure. The effectiveness and functionality of hybrid energy-based EV swapping stations are evaluated using HOMER software. The solar PV system, grid, and bidirectional converter with battery storage contribute to the proposed configuration. HOMER software is used for evaluating the variance of various costs, including net present cost (NPC), initial cost, and cost of energy (COE) for solar PV systems.

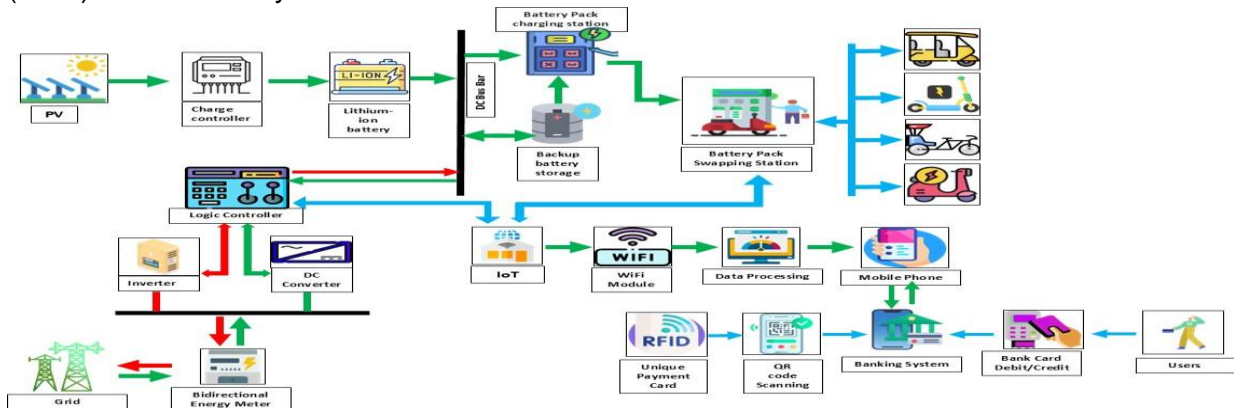


Figure 1: Block diagram of Battery Storage Swapping Station for Electrical Vehicles and Net Metering.



Figure 2: Hardware model of the device.

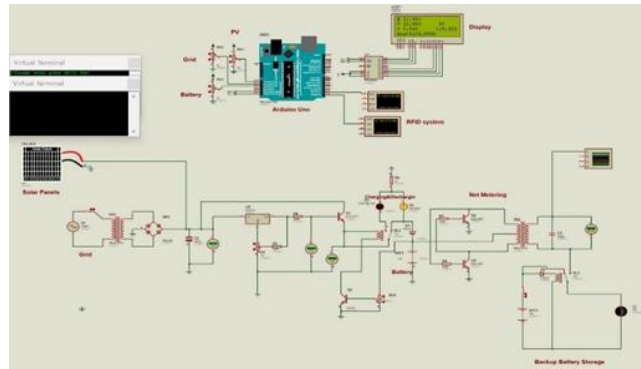


Figure 3: Simulation Schematic for proposed design.

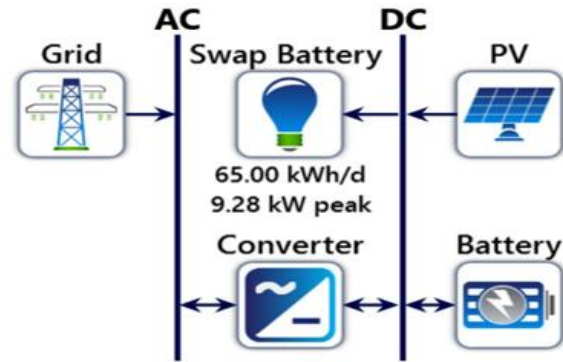


Figure 4: The proposed solar and grid-based hybrid swapping charging system.

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