

# A Smart Station to Charge Electric Vehicles

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**Abstract:** *Electric vehicles have gained a lot of attention lately as a cost-effective, sustainable, and environmentally friendly alternative to cars with internal combustion engines. It tackles issues related to pollution management, global climate change, and petroleum fuels. The design and construction of an electric vehicle hybrid charging station that uses both photovoltaic (PV) and grid power is covered in this study. Additionally, a novel control approach for energy management under various operating situations is suggested. The suggested control makes sure that the system functions as a whole to maximize grid energy utilization. When solar energy is available, the system uses Maximum Power Point Tracking (MPPT) to directly charge the EV. When solar energy is not available, it automatically switches modes of operation. The system exchanges power between PV and the grid. Furthermore, when solar electricity is available but the station is not charging the EV, the technology also feeds the grid with the energy. In the upcoming smart-E-grid model, where EVs share the grid load, reverse power feeding is also incorporated. Even for traditional EV charging stations, the suggested control approach is readily adaptable.*

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