

Title	Joint Optimization Scheme of Electric Vehicles and Smart Home Energies Considering User Comfort Preference
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Abstract

With the emergence of the problems, such as the aggravation of environment pollution, the shortage of non-renewable resources, and so on, a lot of renewable resources are incorporated into the power grid. Electric Vehicle (EV) as a new type of transportation, are becoming more and more popular because of their low pollution and low carbon emission characteristics and also because they reduce the dependency on fossil fuel which make a society more environmental and sustainable.

However, human EV activities will have a significant impact on the power distribution network (smart grid) and increase the home electricity cost if charging and discharging of EVs are not controlled appropriately. So, to solve these problems, it is necessary to analyze the residents' activities, battery storage, charging power level, charging time and so on.

In this thesis, I do a study of charging and discharging scheme of EV for smart homes. In the first chapter, I introduced the development of EV, which is the trend of near future. The objective of this research is to propose a joint optimization scheme for smart homes which can save cost as well as consider residents' comfort. Thus, the smart community simulator is necessary to analyze the daily consumption, residents' activities, the generation of PV and FC. The driving patterns of EV is also necessary.

Chapter 2 presents the introduction about smart home by defining smart home, discussing the components of smart home. In addition, with the development of EV, EV and V2H system are also introduced in this chapter.

Chapter 3 discusses the experiment environment. After the introductions of iHouse and smart community simulator, the models of renewable energy source, residents' activities, EV and home appliances are built.

Chapter 4 presents the objective functions and the constrain conditions. Based on the data of temperature and the PV, FC generation of iHouse, the joint optimization scheme is proposed.

Chapter 5 uses the numerical results of the scheme to analyze the necessity of ESS, EV. It will also let other researchers to further research the situation of multiple-household in a community and schedule other home appliances based on the proposed scheme.

Chapter 6 summarizes the works in this paper, draws contributions of ESS, EV and mentions the future work.

Keywords: smart homes, electric vehicle, user comfort.