

## Random control of smart home energy management system equipped with solar battery and array using dynamic programming

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**Corresponding author:****Milad Fakhri****ABSTRACT:**

Home Energy Management System (HEMS) is an efficient system represented in this article with Battery Energy Storage System (BESS) and optimal Photo Voltaic (PV) systems. In the proposal of HEMS, the charge / discharge regime, BESS capacity and power were determined suitably and desirable as design variables. BESS was used to save the energy in an affordable way during the peak hours of consumption. The proposal programming for determination of optimal operation strategy and BESS measurement represented as a Mixed Integer Non-Linear Programming (MINLP). In addition, the output power generated by the photovoltaic (PV) system was modeled as an indeterminate parameter and with a Probabilistic Distribution Function (PDF). The Monte Carlo Simulation (MCS) was used to deal with uncertainty. This simulation was accomplished using MATLAB 2015 software. The results confirmed that the introduction of HEMS can successfully minimize the annual electricity bills, and can also send energy to the network and spend on profits during high-cost hours.

**Keywords:**

Energy management, Photovoltaic systems, Distribution functions, Battery energy storage system.