

Modelling Home Appliances for Energy Management System: Comparison of Simulation Results with Measurements

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Abstract : This paper presents the modelling and development of a simulator for residential electrical appliances. The simulator is developed on MATLAB providing the possibility to analyze and simulate energy consumption of frequently used home appliances in Albania. Modelling of devices considers the impact of different factors, mentioning occupant behavior and climacteric conditions. Most devices are modeled as an electric circuit, and the electric energy consumption is estimated by the solutions of the guiding differential equations. The provided models refer to devices like a dishwasher, oven, water heater, air conditioners, light bulbs, television, refrigerator water, and pump. The proposed model allows us to simulate beforehand the energetic behavior of the largest consumption home devices to estimate peak consumption and improving its reduction. Simulated home prototype results are compared to real measurement of a considered typical home. Obtained results from simulator framework compared to monitored typical household using EmonTxV3 show the effectiveness of the proposed simulation. This conclusion will help for future simulation of a large group of typical household for a better understanding of peak consumption.

Keywords : electrical appliances, energy management, modelling, peak estimation, simulation, smart home

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