Abstract

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- Degree Sought: M.S. Thesis
- Department: Electrical and Computer Engineering
- Major: Electrical Engineering
- Major Professors: Dionysios Aliprantis and Leigh Tesfatsion

The major purpose of this thesis is to achieve indirect load control in the distribution system with a view to achieve increased consumer participation and peak load reduction. In particular, this thesis sets forth a novel intelligent residential air-conditioning (A/C) system controller that provides optimal thermal comfort and electricity cost trade-offs for a household resident based on four key aspects, namely (i) resident's behavioral preferences, (ii) structural attributes of the house and the A/C system, (iii) retail price signal, and (iv) environmental conditions. It also describes a computational platform that tests the effects of the residential demand arising from the intelligent A/C system on the wholesale and the retail power system. An interesting feedback loop is established between the wholesale and the retail power system in that, the retail energy prices affect the aggregated load at the wholesale level that in turn affects the retail energy prices.