CHPB-31-2018: Development of a Scalable Approach for Electrical Demand Management Using the Building as Energy Storage

Motivation and Problem

- Small & medium sized commercial buildings (<50,000 ft. sq.) are a tremendous market for a scalable demand response product
- Load-cost control architectures needed for optimal load shaping in SMCBs → leads to challenges in modeling & load prediction
- A scalable solution should overcome those issues

Objective

Develop and demonstrate practical modeling and control strategies that require minimal sensors for SMCB applications, and that enable the use of buildings' thermal mass as an effective demand response resource for load shifting and peak demand reduction.

Approach

1. Develop an overall identification approach to reject unmeasured disturbances in the modeling phase
2. Design a compensator to account for long-term load prediction errors associated with the disturbances in the control phase

⇨ Modeling and control approaches will be extended from previous CHPB- UC project outcomes.

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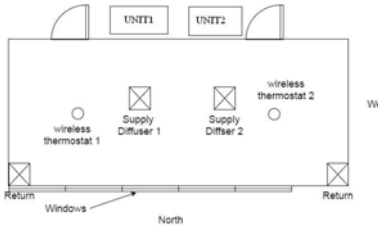
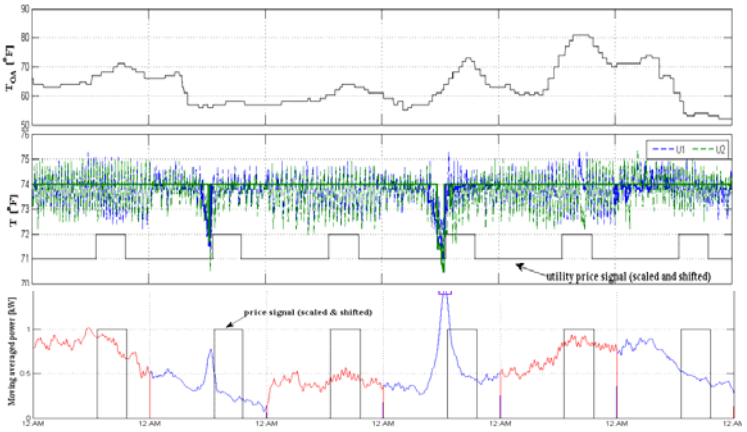
Preliminary result of a load shifting controller in a lab

External view of conference room and floor plan





- **Two packaged units (1 and 2 ton)**
- **Clear distinct behaviors (blue: EUC, red: Conv)**
- **Clearly shifts building loads and the responses with respect to an electric price signal were different from day to day depending on predicted cooling loads**

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