Eco-feedback and incentive mechanism design for multi-residential building

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Goal: The development of an energy management tool for multi-unit residential buildings that encourages energy conservative behaviors among residents.

- Actionable feedback design using programable thermostat
- Incentive mechanism design

Project Description

Approach

- Collect baseline energy consumption and thermostat data from a 50 unit multi-residential building located in Indianapolis.
- Design a simple evaluation matrix that easily describes occupants’ baseline behavior in terms of energy conservation.
- Develop a game theoretic model that provides optimal incentives.

Discussion

Occupant behaviors are evaluated during the three states of occupancy Home/Away/Sleep.

- Applied rule-based occupancy state classification.
- Evaluated setpoint control and thermostat off actions.

Results

1. Occupancy state detection

2. Evaluation

3. Evaluation result

Customized information and actionable feedback is required to change the behaviors of occupants in residential house.