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Energy Use in Buildings Enabling Technologies

Title

A Disaggregated Thermostat: Enhancing Comfort, Energy Efficiency, and Demand Response

Permalink

<https://escholarship.org/uc/item/28w033n2>

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A Disaggregated Thermostat:

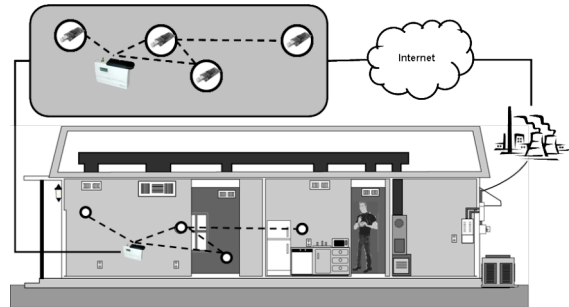
Nathan Ota
Paul Wright

Enhancing Comfort, Energy Efficiency, and Demand Response

Vision

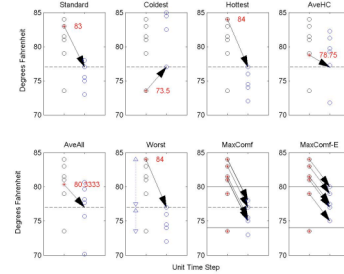
Design and implement a wireless sensor network enabled residential energy management system that reliably balances occupant satisfaction and energy savings preferences with automatic, reactive short-term load shedding and long-term energy reduction.

	Old Way	New Way
Actuates	On/Off	On/Off
Uses	Single sensor	Multiple sensors
Measures	°F	°F, RH
Controls	°F	Comfort, cost
Aware	n/a	price, weather



Research Questions

- How can an HVAC system react differently given environmental conditions from all rooms?
- How does an HVAC system tradeoff comfort and energy consumption?
- How can an HVAC system react differently given electricity price information?



Methods

- Simulations to evaluate multi-sensor HVAC control with distributed sensing for 4 house designs, 4 comfort offsets, 2 operational modes, and 2 weather profiles.
- Wireless communication performance site surveys to characterize packet-level communication.
- Design and development of autonomous embedded agent system for in-situ system pilot tests.
- Real world and testbed deployments of HVAC control with distributed sensing.

Findings

