REM Residential Energy Management

An Application-Drive Wireless Sensor Network Design

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INTERNET

CASIO.CSV

Imx.AAO

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Database

PHP + MySQL

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 without changing sensor node batteries for 10 years.





• 64 simulations to evaluate HVAC control with distributed sensing for 4 house designs, 4 control deadbands, 2 operational modes, and 2 weather profiles.

• 5 wireless communication performance site surveys to characterize packet-level communication.

• Development of autonomous embedded Java software for in-situ system pilot tests. In-situ pilot tests of HVAC control with distributed sensing occurring during Summer 2006.





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Demand Response Enabling Technology Development UC Berkeley | CBE | BMI | CEC Research Questions

- How can a HVAC react differently given environmental conditions from all rooms?
- How reliable is 2.4GHz communication in houses?



•How much ambient energy is available in a residential environment? Is it needed?

• How can energy consumption be cost-effective monitored?

Findings

• Aggregated packet loss < 10%, short bursty events.

• +/- 10% HVAC energy estimate using distributed temperature sensing (using from measured data).

• HVAC Control with distributed environmental sensing can reduce energy consumption by more than 30%.

