

Demand Response via Privacy Preserving Thermal Inertial Load Management by an LSE

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How smart is your smart thermostat



January 4, 2008

Who Will Control Your Thermostat?

By Joseph Somsel

"We repeat, there is nothing wrong with your thermostat. You are about to participate in a great adventure. You are about to experience the awe and mystery which reaches from the inner mind to ... SACRAMENTO!"

Day Ahead Price



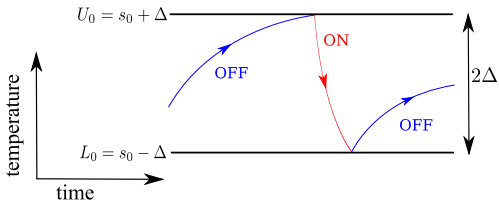
Desired power consumption

High

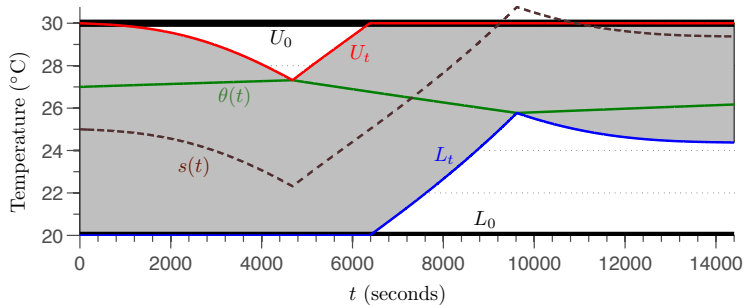
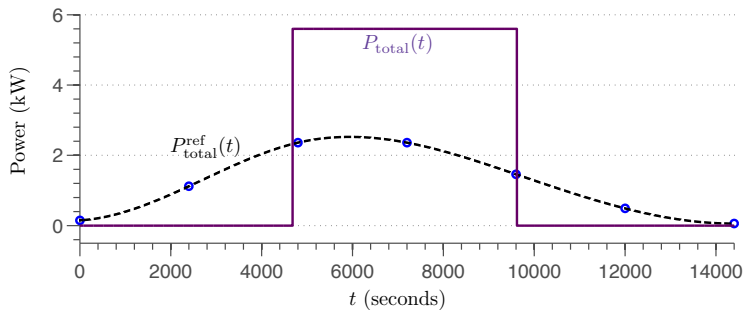
Low



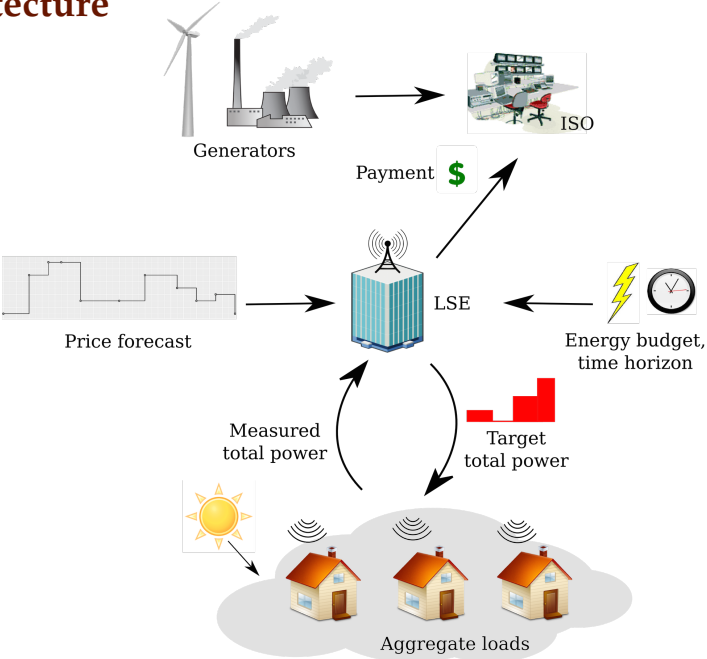
Temperature trajectory



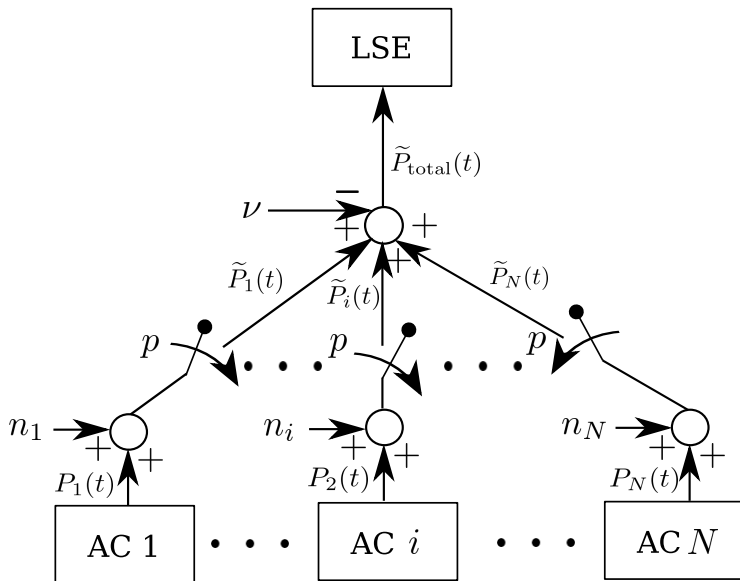
Deadband \rightarrow Liveband



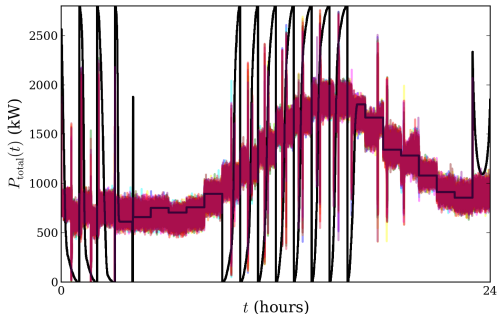
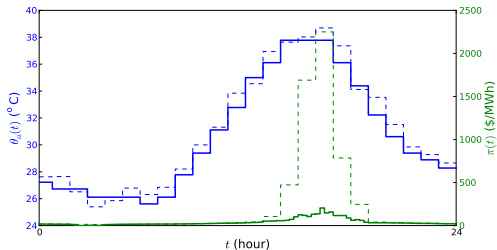
Architecture



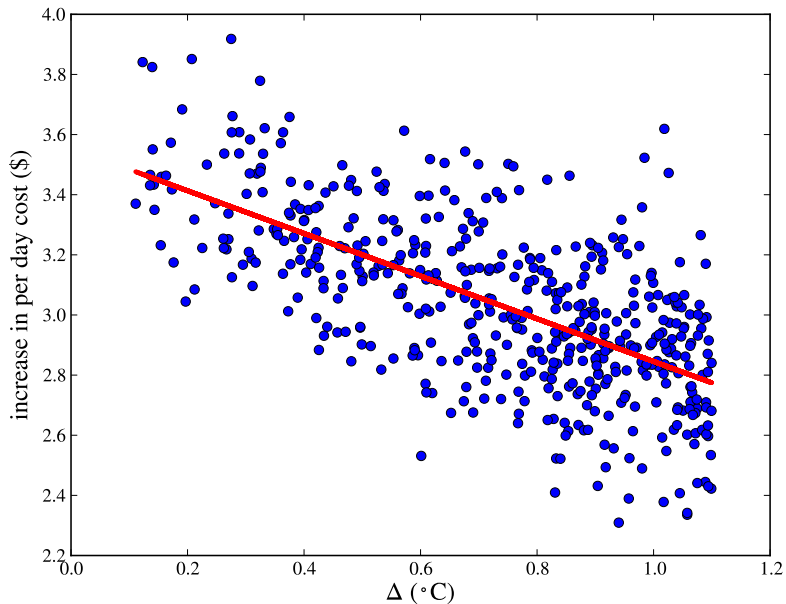
Privacy preserving sensing of total power



Simulation for 500 homes + ERCOT DA price



How can the LSE price a contract



Summary

1. Privacy preserving aggregate sensing
2. Individual comfort guarantees
3. Contract cost \propto QoS
4. Mathematically optimal, no ad-hoc fix

Wishlist

1. Hardware implementation of thermostatic control
2. Pilot project to implement the architecture