Title: Distributed Model Predictive Control for Housing with Hourly Auction of Available Energy

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Abstract: This paper presents a distributed model predictive control (DMPC) for indoor thermal comfort that simultaneously optimizes the consumption of a limited shared energy resource. The control objective of each subsystem is to minimize the heating/cooling energy cost while maintaining the indoor temperature and used power inside bounds. In a distributed coordinated environment, the control uses multiple dynamically decoupled agents (one for each subsystem/house) aiming to achieve satisfaction of coupling constraints. According to the hourly power demand profile, each house assigns a priority level that indicates how much is willing to bid in auction for consume the limited clean resource. This procedure allows the bidding value vary hourly and consequently, the agents order to access to the clean energy also varies. Despite of power constraints, all houses have also thermal comfort constraints that must be fulfilled. The system is simulated with several houses in a distributed environment.

Author Keywords: DMPC; DSM; Limited resources; Energy auction

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