# AIChE Webinar Series

*Computing & Systems Technology Division (CAST) Welcomes*


## Krystian Perez

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# *Meters to Models:*
# *Using Smart Meter Data to Predict and Control Home Energy Use*


**Abstract:**

Access to smart meter data in the United States presents an opportunity to better understand residential energy consumption and energy-related behaviors. Air-conditioning (A/C) use, in particular, is a highly variable and significant contributor to residential energy demand. Most current building simulation software tools require intricate detail and training to accurately model A/C use within an actual house. However, integrating existing modeling software and empirical data has the potential to create highly portable and accurate models. Reduced order models (ROM) are low-dimensional approximations of more complex models that use only the most impactful variables. In this paper, we report on the development of ROMs for 41 physical houses in Austin, Texas, using smart meter data. These models require outdoor dry bulb temperature, thermostat set points and A/C energy use data to regress model coefficients. A non-intrusive load monitoring technique is used to disaggregate A/C electricity consumption from whole-house electricity data reported by smart meters. Thermostat set points are provided by smart thermostats. Once trained, the models can use thermostat set points and dry bulb temperatures to predict A/C loads. The ROMs are used to simulate the potential of the houses to reduce peak demand using automated thermostat control schemes.


**Biography:**

Krystian Perez is a PhD candidate in chemical engineering at the University of Texas at Austin working under Dr. Tom Edgar and Dr. Michael Baldea. He earned his B.S. degree in chemical engineering from Brigham Young University in Utah. He is developing a residential neighborhood model based on the human activity patterns, weather trends and first principles of an individual home. From this model he would like to determine the most efficient means to use alternative energy sources (e.g. photovoltaics) and energy storage devices (e.g. thermal storage tanks) to mitigate peak energy demand at the level of an entire residential community. Krystian is the recipient of a National Science Foundation (NSF) Graduate Research Fellowship.

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