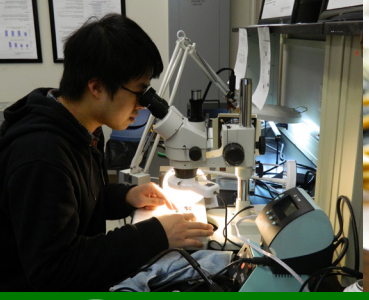
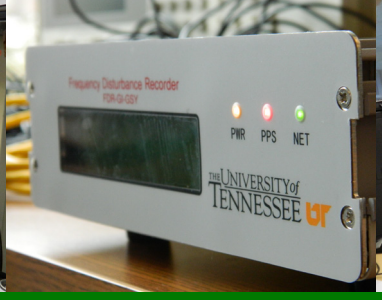


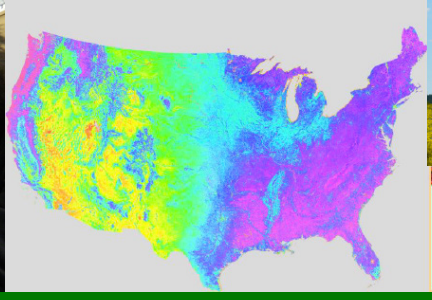
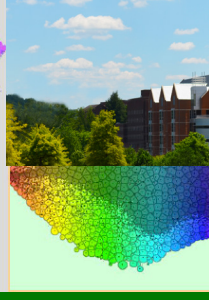

CURENT

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RESEARCH

Social Behavioral Analysis for Demand Response, Renewable Technology and Energy Efficiency

Overview and Goals

CURENT's social behavioral research applies social-psychology theories and approaches to facilitate engineering research on improving power grid stability, renewable energy penetration and energy efficiency (Fig. 1). Goals include:

- Fostering interdisciplinary research from the areas of power systems, renewable energy, demand response (DR), occupant behaviors and social psychology.
- Integrating social-psychological factors and decision-making processes into engineering modeling to better understand demand response, customer segmentation, and acceptance of renewable energy and smart home management systems.
- Analyzing occupant behaviors in commercial buildings to improve energy efficiency based on group and organizational theories and occupant modeling.
- Providing fundamental knowledge to industry and policy makers.

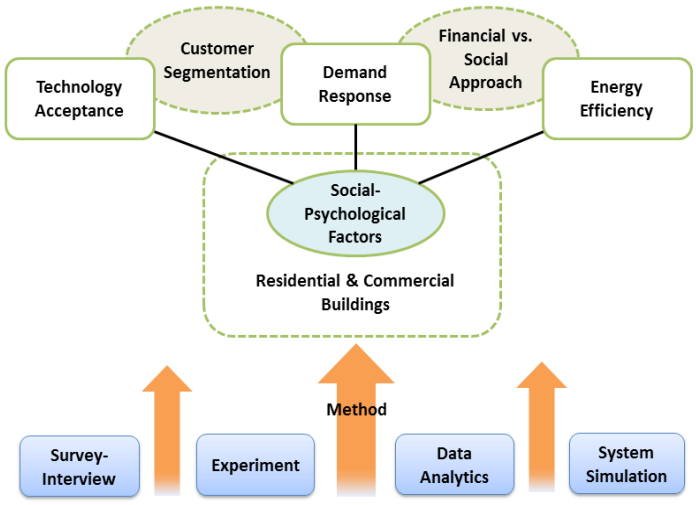

Fig. 1 Research overview

Impact

- Help policy makers, industry, and researchers understand the social and human factors involved in load control and technology adoption.
- Develop updated demand response and energy efficiency solutions for industry.
- Identify new research topics in the areas of energy and social science. Build communications within and beyond CURENT, and provide engineering students with a broader viewpoint.

Network and Collaborations

- NSF RCN-SEES: Predictive Modeling Network for Sustainable Human-Building Ecosystems (SHBE).
- International Energy Agency (IEA), Energy in Buildings and Communities (EBC), Annex 66.
- Advanced Collaborative Research Organization for Smart Society (ACROSS), Waseda University, Japan.

Major Projects in Process

1) *Acceptance of Smart Meter Technology* - Fig. 2 shows the structural equation modeling results of a survey on 711 U.S. residents. The survey indicates that perceived usefulness was the strongest predictor among all technology attributes, followed by perceived privacy risks.

   Trust in utility companies, money consciousness, and energy concern affect smart meter support, and adoption via their influences on Usefulness and Privacy. Political orientation has some impact on trust and energy concern.

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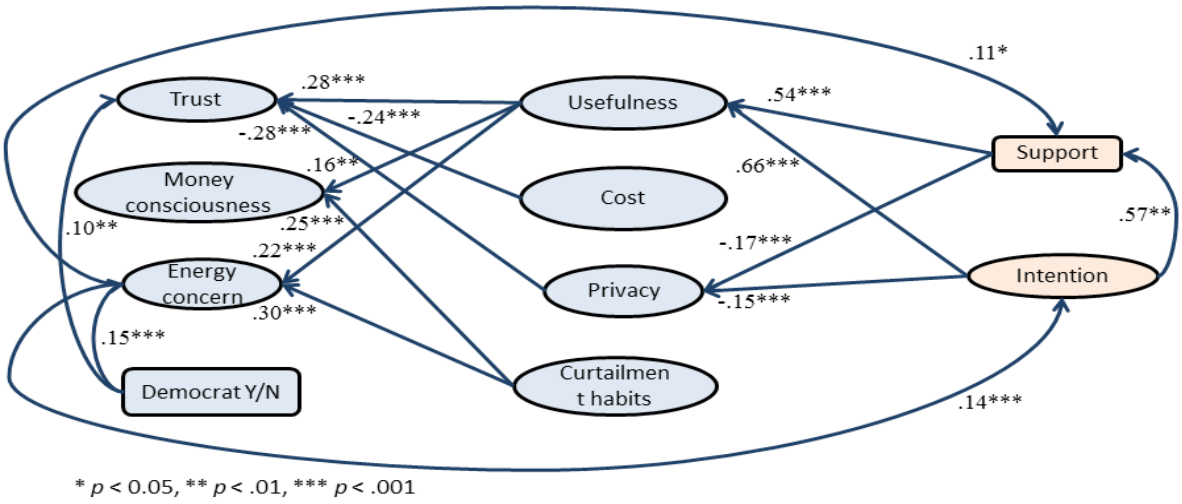

Fig. 2 Structural equation model predicting support for and intention to use smart meter technology

2) Demand Response Incentives and Customer Segmentation - Fig. 3 shows potential response rates to several different DR programs (e.g., adjusting 2-3 degrees at home) when a certain level of financial incentive (a monthly bill reduction), is provided. Based on a sample of 1465 U.S. residents, social-psychological variables were found to influence the responses. Table 1 shows the three blocks of predictors of respondents' decisions to allow utility companies adjust their thermostat settings, with the significant ones being highlighted in orange.

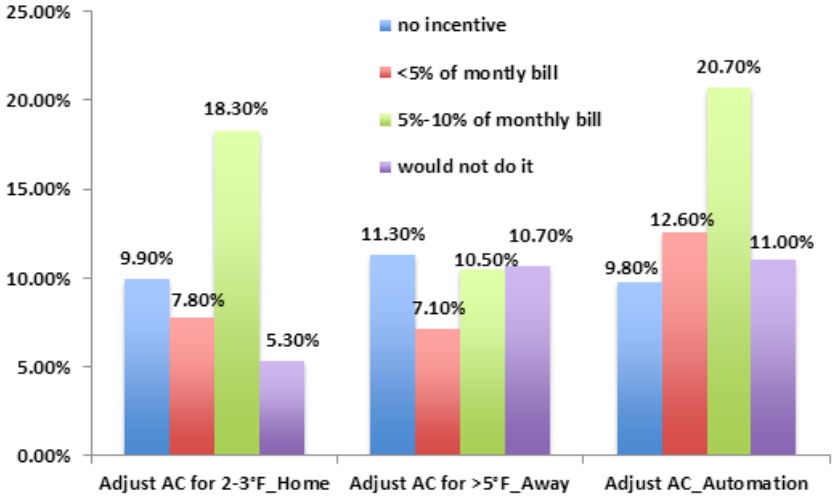

Fig. 3 (left)

Energy Use Profile	Demographics	Social-Psychological
Weather Region	Age	Environmental Concern
Dwelling Size	Gender	Money Attitude (Bills)
Average Monthly Bill	Income	Money Attitude (Bargain)
Stay Home (9am-5pm)?	Education	Comfort Need (Summer)
Habit (Lights)	Political Orientation	Comfort Need (Winter)
Habit (Computer)	Household Size	Need for Control
Habit (A/C)		Trust in Utility Company

Table 1 (left)

3) Occupant Behavior and Energy Use in Commercial Buildings - Interviews, surveys and field experiments are conducted to identify the main predictors of energy efficiency behaviors and related issues of building occupants (i.e., thermal comfort, job stratification and productivity) in the workplace. Both individual and organizational factors are considered.

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