**Related Work**

Until recently, occupant behavior has been difficult to accurately capture. Adherence to self-reports of behavior and energy consumption is error prone for some populations [11] and whole-home meter monitoring does not capture the behaviors in the home that influence consumption.

至今，居民行为仍然难以精确捕获。行为和能耗的自报告，针对某些人群，错误率较高[11]；并且，全家的电表测量并不能抓取影响能源使用的行为。

Approaches have been utilized to explore the gap between the minimum amount of consumption that is needed for daily activities and the consumption that is actually observed [13]. Some early work has focused on linking resident activity with energy consumption. The hypothesis that providing users with knowledge about the relationship between their activities and energy consumption and automation support for energy reduction will result in substantial decreases in overall consumption is supported by an increasing body of work that links awareness of energy consumption and its impact on behavioral routines and behavioral change [1, 5, 9].

相关学者已经使用许多方法，来研究维持居民生活所需的最小能耗与实际观测到的能耗的差[13]。一些早期工作关注点在于：找出居民活动与能耗的映射关系。 大量有关能耗感知以及其对居民日常行为的影响的研究支持一个假说，即：通过提供用户日常活动和能耗的关联知识，并给予用户节能的自动化支持，可以帮助用户极大地减少家庭总能耗[1, 5, 9]。

Until recently, validating this hypothesis was not possible. However, with the convergence of technologies in ubiquitous computing and machine learning, gathering data on human behavior is now automatable. Data can be collected from sensor-filled smart homes [2] and smart phones [6] in an unobtrusive manner while individuals perform their normal daily routines. Because these sensor modalities operate in a continuous mode, feedback and interventions repeat ad infinitum, thereby maximizing the persistence effect.

到目前为止，验证该假说的正确性还不可能。然而，随着普适计算方法和机器学习技术的结合，人行为数据的采集过程已经可以自动化。数据可以用一种不引人注意的方式，从部署有传感器的智能家庭[2]和智能手机[6]采集；采集过程不会对用户的日常生活造成干扰。因为这些传感程序工作在连续模式，并且反馈和设备控制可以持久重复，所以可以达到持久的效果。