

New system for monitoring electricity use heralds greener homes and cheaper bills

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During the winter months the days grow colder and the nights longer causing households to use more electricity, often resulting in higher bills. Most households have no way of monitoring how much electricity is being consumed; however, researchers in Pittsburgh believe a new monitoring system may soon be available for residential use. The research is published in a special issue of Yale's *Journal of Industrial Ecology* on environmental applications of information and communication technology sponsored by CSC's Leading Edge Forum.

"There are many opportunities for reducing [electricity consumption](#) in buildings, but identifying and quantifying them is often very difficult, particularly in single-family homes," said Dr Mario Berges from Carnegie Mellon University. "This means that for most residents the only indicator of consumption they have is their monthly electricity bill."

Dr Berges's team analysed non-intrusive load monitoring (NILM), a novel technique for deducing the [power consumption](#) and operational schedule of individual loads in a building from measurements of the overall voltage and current feeding it.

NILM uses a single whole-house meter, connected to software in an embedded device or computer to provide appliance-level energy metering. The system monitors the signals on electrical wires, and then uses signal processing and machine-learning algorithms to identify which device caused the change in electricity use, matching it against a library of known signatures from different devices.

Currently, residential buildings account for as much as 37% of the total electricity use in the United States, so a system such as NILM which provides continuous monitoring could make households greener as well as more cost effective.

Because NILM systems often require a training period during which the different appliances in the home are switched through the different modes of operation in order to populate the library of signatures, the researchers explored the idea of incorporating these steps into the typical one-time visit of residential energy auditors.

"This form of non-intrusive load monitoring may be able to provide a new type of continuous electrical audit for residential buildings, down to the appliance level," concluded Berges. "While costs can only be estimated at this point, it is possible that the price of such a system could be similar to that of the whole-house meters currently available on the market, approximately \$200 per residence."

Provided by Wiley

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