

# Researchers discover potential key to lowering energy costs of cell phones and data centers

February 9 2012

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(PhysOrg.com) -- A systematic analysis of power usage in microprocessors could help lower the energy consumption of both small cellphones and giant data centers, report computer science professors from The University of Texas at Austin and the Australian National University.

Their results may point the way to how companies such as Google, Apple, [Intel](#) and [Microsoft](#) can make software and hardware that will lower the [energy costs](#) of very small and very large devices.

“The less power cellphones draw, the longer the battery will last,” says Kathryn McKinley, professor of computer science at The University of Texas at Austin. “For companies like [Google](#) and Microsoft, which run these enormous data centers, there is a big incentive to find ways to be more power efficient. More and more of the money they’re spending isn’t going toward buying the hardware, but toward the power the data centers draw.”

McKinley says that without detailed analysis or power profiles of how [microprocessors](#) function with different software and different chip architectures, companies are limited in their ability to optimize for energy usage.

[The study](#) she conducted with Stephen M. Blackburn of the Australian

National University and their graduate students is the first to systematically measure and analyze application power, performance and energy on a wide variety of hardware.

This work was recently invited to appear as a Research Highlight in the *Communications of the Association for Computer Machinery*.

Energy efficiency has become a greater priority for consumers, manufacturers and governments because the shrinking of processor technology has stopped yielding exponential gains in power and performance. The result of these shifts is that hardware and software designers have to take into account tradeoffs between performance and power in a way they did not have to 10 years ago.

“Say you want to get an application on your phone that’s GPS-based,” says McKinley. “In terms of energy, the GPS is one of the most expensive functions on your phone. A bad algorithm might ping your GPS far more than is necessary for the application to function well. If the application writer could analyze the power profile, they would be motivated to write an algorithm that pings it half as often to save energy without compromising functionality.”

McKinley believes that the future of software and hardware design is one in which power profiles become a consideration at every stage of the process.

Even consumers may get information about how much power a given app on their smartphone is going to draw before deciding whether to install it.

“In the past, we optimized only for performance,” she says. “If you were picking between two software algorithms, or chips, or devices, you picked the faster one. You didn’t worry about how much power it was

drawing from the wall socket. There are still many situations today — for example, if you are making software for stock market traders — where speed is going to be the only consideration. But there are a lot of other areas where you really want to consider the [power](#) usage.”

Provided by University of Texas at Austin

Citation: Researchers discover potential key to lowering energy costs of cell phones and data centers (2012, February 9) retrieved 27 April 2024 from <https://phys.org/news/2012-02-potential-key-lowering-energy-cell.html>

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