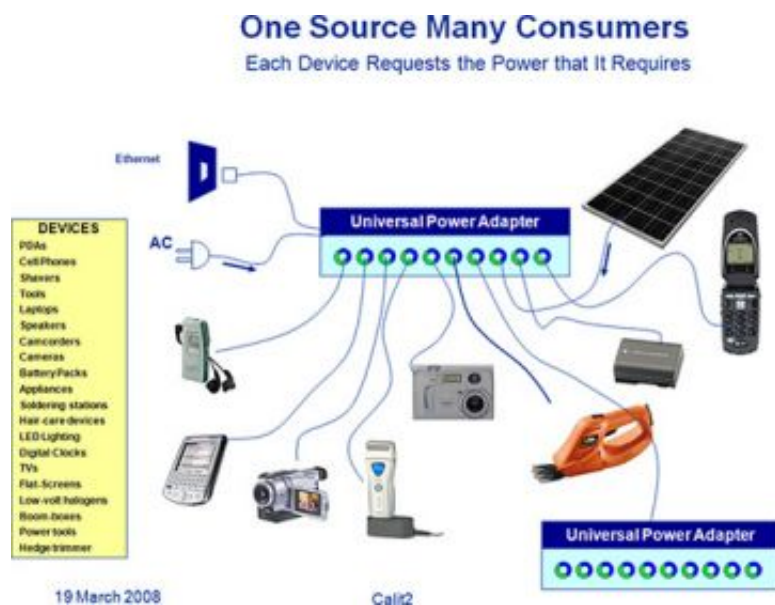


Universal Power Adapter Offers Alternative to Wall Warts

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The uPower adapter would be compatible with many devices and would provide only as much voltage as they need.

When Doug Palmer realized he had forgotten his mobile phone adapter on a vacation in Mexico several years ago, the first thought that crossed his mind was, "There has to be a better way."

Palmer, a principal development engineer at the UC San Diego division of the California Institute for Telecommunications and Information Technology (Calit2), has long been frustrated with what he calls "the annoying wall wart." A slang term for external power adapters, wall

warts are used to convert the electrical current and voltage of a wall socket into the actual operating current and voltage used by devices such as mobile phones and laptops. Their less-than-flattering sobriquet derives from a cumbersome design: Wall warts are often so large that they block other outlets, and so heavy that they can fall out of the wall socket entirely. Critics have also assailed manufacturers of wall warts for causing dependence on their product-specific adapters (as Palmer found out the hard way).

Worse still, wall warts suck up a staggering amount of electricity. According to a 2001 speech he delivered to Department of Energy employees, President Bush (who referred to the devices as "energy vampires") said that wall warts consume an estimated 4 percent of all the electricity used in the average U.S. home. Extrapolated to a national scale, that's a total of about 52 billion kilowatt hours, or the energy produced by 20 average-size power plants. In addition, adapters are often discarded once a consumer abandons the associated device. With 2.5 billion rechargeable devices sold in 2002 alone, that's a lot of electronic waste taking up space in landfills.

The "better way" that Palmer hopes for just might be emerging in the research laboratories at Calit2. Palmer is in the initial stages of designing a prototype for what he calls a Universal Power Adapter — a "smart" replacement for traditional wall transformers that would supply both power and communications to consumer electronics.

Informally known as uPower or UPA, the adapter would serve as a single power supply for one or more mobile or fixed devices or power packs. Once hooked up to the uPower adapter, an electronic appliance would use low data-rate communications to "request" the voltage it needs, and the adapter would adjust volts to operate the appliance. According to Palmer, this means there is conceptually no limit to the variety of devices (even hybrid cars) that could be plugged into the UPA.. Palmer

says that in the future, he envisions the uPower adapter replacing the typical plastic wall plate, with its limited two-plug capacity for powering electronics.

Using the UPA also makes powering electronic devices more efficient. Currently, the U.S. electric power grid delivers electricity at 220 or 110 volts, but more and more devices require only 3 to 12 volts. The UPA would provide only the voltage needed — no more, no less. Furthermore, once light bulbs are replaced by far more efficient light-emitting diodes (LED) as many lighting industry leaders believe they will be, only a few appliances around the home and office will require high voltage electricity (the garbage disposal and washing machine are among them), making the UPA a practical alternative to bulky external adapters and wall plates.

Palmer also envisions the design of the adapter to allow for device-to-device communication, meaning that both power and data communication are delivered to the device over the same line, much the way that a USB cable works.

Another key component of the adapter is its ability to accept power from solar energy. Palmer's idea is for consumers to "get off the grid" entirely by buying an inexpensive solar panel to supply power to the adapter, creating what's known as a "nano-grid." These small, cheap solar panels, combined with the UPAs, would provide a low-cost alternative to using grid power.

Regardless of how consumers use the device, the cost and energy savings are significant, Palmer says.

"If you can start buying little low-cost solar panels and start nibbling away at your electricity costs that way, you can really bring your electricity bill down. The average wall warts or 'house parasites' cost the

consumer \$10 a month.

"And let's look at the energy savings as well," he continued. "Even when they're just plugged in and not powering anything, those little wall warts suck up three watts. Three watts multiplied by three billion wall warts? How much coal is that? How many trees? Ten percent of all energy consumed in the U.S. is just for keeping wall warts warm. And the average suitcase has over one pound of wall warts in it. Think of all the fuel that's used to haul them around!"

Several other features of the uPower adapter reflect its "smart" design. When hooked up to the grid, the adapter can adjust during brownouts to do non-peak power charging and utilization. It can also transfer power between devices, if required. For example, if both your mobile phone and MP3 player were plugged into the device and one was charged, but the other was depleted, the UPA would recognize the discrepancy and take power from one device to charge the other.

The "smart" design of the UPA could also help improve conditions in the developing world. Palmer is collaborating with Srinivas Sukumar, manager of Calit2-San Diego's India Initiative, which works with the Indian government, universities and non-governmental organizations to create collaborative projects. Sukumar says he sees endless ways that India's population of 1 billion people could use the uPower adapter, especially since the country lacks a reliable power grid.

"The way to think about it is, what are the essentials?" he said. "Rather than solve the whole problem, our solution is practical and small. Right now, lighting is potentially the biggest application for the adapter when paired with a low-cost solar panel."

"When I tell people about the UPA," Palmer says, "They all say, 'Gosh, I wish I had that.'" And he has the facts to back him up: Forrester

Research recently revealed that 25 million U.S. adults are willing to spend more for gadgets that use less energy or employ environmentally conscious design.

So, perhaps the question isn't if people will support uPower, but when?

"The challenge is not technical in terms of implementing it," Sukumar said. "The real challenge is to get manufacturers to redesign their products. Essentially, what this means is an entirely new ecosystem will have to be developed. This is a huge challenge. We're dealing with a completely different paradigm."

For the uPower to be compatible with the multitude of electronic devices that consumers use everyday, the manufacturers of those devices would have to not only redesign their power components, but would also have to make them "speak the same language" as the UPA, Palmer says.

Explains Sukumar: "It's a disruptive technology. That is, the entry point is difficult and it feels like it has disadvantages. Except that if it grows in scale, it tends to create an alternate paradigm. It's a matter of 'which is going to be the first shoe to drop?'"

"And once it does," Palmer added, "consumers will be calling the shots."

One San Ramon-based company is already looking to tap into consumer interest in universal adapter technology. Greenplug, which has just signed on as a partner with Westinghouse, has created an embedded power supply technology for consumer electronics that allows power supplies to "communicate" with those devices and agree upon power requirements. Greenplug's own research underscores the consumer distaste for "wall warts": A study commissioned by the company in May shows that more than 60 percent of American consumers view incompatible power adapters as "wasteful" or "frustrating."

Currently, Palmer is seeking outside funding to develop a prototype for the uPower technology, and has spoken to Ford and Qualcomm about implementing the device into some of their products. He and Sukumar are hoping to organize a workshop that will raise visibility about the adapter, and eventually create a "Center of Excellence" focused on the technology, possibly called "Center for Intelligent Micropower Systems."

Palmer is hopeful that with government mandates to develop more efficient power supplies and the growing "green movement" among consumers, uPower and other technologies like it will pave the way for a revolution in energy consumption.

"It seems like while we're trying to shovel our way into this, a big bulldozer is coming," he said. "We need to bring the people together, and through that synergy will come the funding and resources. It's the generation that hasn't been born yet who will go nuts for this."

Source: University of California, San Diego

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