MOBILE DATABASE · ARTICLE

WITRICITY

Author / organisation	Enterprise Resilience Management Blog
Year recorded	2007
Region	Global
Category	Other
Original source	enterpriseresilienceblog.typepad.com
Archive page	kiwanja.net/mobile-database/witricity/

This document is part of the kiwanja.net Mobile Database, an archive of more than 700 articles, reports and projects on mobile technology for development, collected between 2003 and 2010. It is reproduced here for reference; the original author's rights are retained.

The Coming Age of WiTricity?

As the world becomes more connected, its reliance on electrical power also increases. Currently, getting power to devices requires either wires -- strung on poles above ground or running through pipes buried underground -- or batteries (which are sometimes recharged by connecting to a wired system). Researchers at the Massachusetts Institute of Technology are trying to find an efficient way to distribute electricity without wires ["MIT Team Powers Light Bulb Without Wires," by Brian Bergstein (AP), *Washington Post*, 8 June 2007]. Bergstein reports:

> "Massachusetts Institute of Technology researchers announced Thursday they had made a 60-watt light bulb glow by sending it energy wirelessly, potentially previewing a future in which cell phones and other gadgets get juice without having to be plugged in. The breakthrough, disclosed in Science Express, an online publication of the journal Science, is being called 'WiTricity' by the scientists. The concept of sending power wirelessly isn't new, but its wide-scale use has been dismissed as inefficient because electromagnetic energy generated by the charging device would radiate in all directions. Last fall, though, MIT physics professor Marin Soljacic (pronounced soul-ya-CHEECH) explained how to do the power transfer with specially tuned waves. The key is to get the charging device and a gadget to resonate at the same frequency -- allowing them to efficiently exchange energy. It's similar to how an opera star can break a wine glass that happens to resonate at the same frequency as her voice. In fact, the concept is so basic in physics that inventor Nikola Tesla sought a century ago to build a huge tower on Long Island that would wirelessly beam power along with communications. The new step described in Science was that the MIT team put the concept into action. The scientists lit a 60-watt bulb that was 7 feet away from the power-generating appliance."

The scientists are aware that society could give their breakthrough a big "So What?"

> "The development raises the prospect that we might eliminate some of the clutter of cables in our ever-more electronic world. Is that necessarily a good thing? Soljacic acknowledged 'that it's far from obvious how crucial people will find this.'"

I'm not one of those who wonders if a breakthrough like this could be crucial. Let me give you a few examples. For decades analysts concluded that African countries weren't interested in telecommunications because they repeatedly refused to invest in the infrastructure required to install telephone landlines. When mobile phone technology came along, African countries became some of the fastest growing markets for that technology. In many of those same states, building the electrical grids that are sorely needed remains prohibitively expensive. Imagine the impact on a developing state if electricity could be efficiently generated by small plants strategically located throughout the country then distributed wirelessly. The results would be revolutionary. One of the challenges of those trying to get computers into the hands of children around the world is ensuring those PCs remain adequately powered. Having a PC without power isn't any better than having no PC at all. Mobile phones are another challenge. Even in rural areas that have good mobile phone coverage, there might not be electrical power available for recharging phone batteries. Also consider the labor saving devices that could be used to free children to go school instead of having to help scrape out a living.

You can also consider the national security arena. As military forces become more connected, ensuring that those operating on foot, in remote locations, and in small groups remain on online often involves the logistical challenge of making sure they have enough batteries on hand. When soldiers have to carry batteries as well as bullets, it becomes an extra burden. Imagine being able to launch an unmanned vehicle equipped with a power source and distribution system that could linger overhead and provide power to troops to on the ground -- freeing them from having to carry extra batteries or positioning ground systems that could alert adversaries to their presence

positioning ground systems that could alert adversaries to their presence.

Right now, of course, those scenarios remain in the realm of science fiction. The current system is too inefficient and its ranges too short to achieve any of the scenarios I imagined above. In fact, it may never be possible.

> "The MIT system is about 40 percent to 45 percent efficient -- meaning that most of the energy from the charging device doesn't make it to the light bulb. Soljacic believes it needs to become twice as efficient to be on par with the old-fashioned way portable gadgets get their batteries charged. Also, the copper coils that relay the power are almost 2 feet wide for now -- too big to be feasible for, say, laptops. And the 7-foot range of this wireless handoff could be increased -- presumably so that one charging device could automatically power all the gadgets in a room. Soljacic believes all those improvements are within reach. The next step is to fire up more than just light bulbs, perhaps a Roomba robotic vacuum or a laptop."

As you can see, going from electrifying a room to electrifying a nation is a huge leap. The other concern, of course, is health. We have all heard about health concerns for those living near electrical distribution lines. Real or imagined, these concerns are already being addressed.

> "The MIT team stresses that the 'magnetic coupling' process involved in WiTricity is safe on humans and other living things. And in the initial experiments on the light bulb, nothing bad happened to the cell phones, electronic equipment and credit cards in the room -- though more research on that is needed. The harmlessness apparently extends both ways: The researchers noted that putting people and other things between the coils -- even when they block the line of sight -- generally has no effect on the power transfer."

This all sounds very interesting and exciting and it is a technology worth watching. I hope the research moves ahead quickly. Even if only small systems can be built, combining solar power generation with this kind of wireless distribution system could make a huge difference in the quality of lives in remote villages. Such a system could be used to pump and distribute well water, freeing villagers for more productive work. It could power small home operated businesses and appliances. It could power schoolhouses connected to remote educators who could provide a first rate education for children who are now illiterate. The possibilities are endless.

ADDENDUM

The 21 May 2007 issue of BusinessWeek had a snippet in its "Innovations" section that discussed research into wired walls being conducted in Japan.

> "What if the walls had not ears, but energy? That's the idea behind an electricity-conducting film developed at the University of Tokyo that could one day be used as wallpaper, wirelessly powering up electronic devices. Now, cell phones, laptops, and the like need to be plugged into a socket for recharging. The researchers, led by Takao Someya, printed a matrix of transistors, position-sensing coils, and tiny switches onto a plastic sheet just 1 millimeter thick. It can detect when a gizmo makes contact, then channel up to 40.5 watts of power to it. Humans needn't worry—only the appliances would receive the charge. A tablecloth of this material could keep a computer on the table juiced up, and wallpaper might power a flat-panel TV."