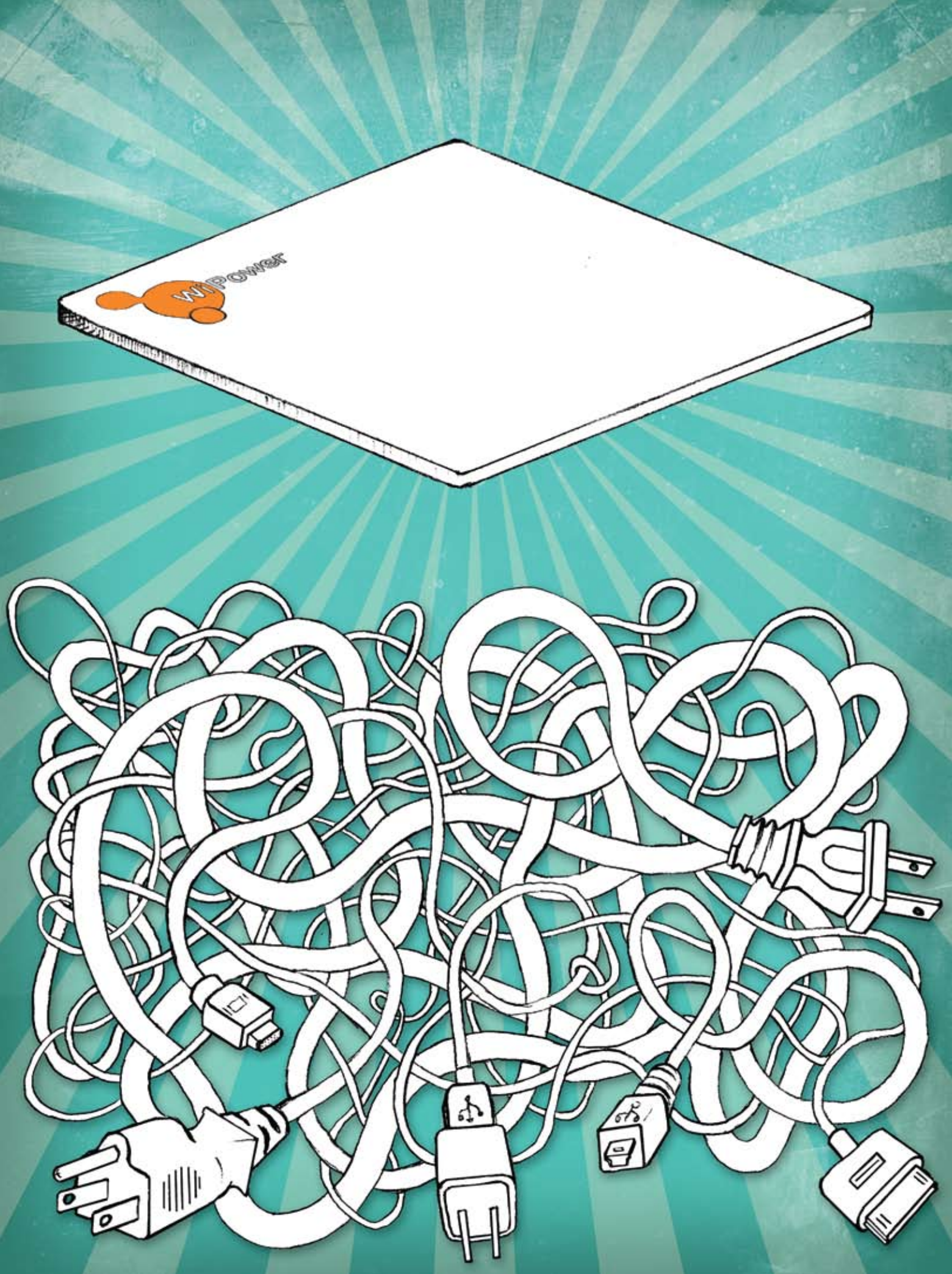
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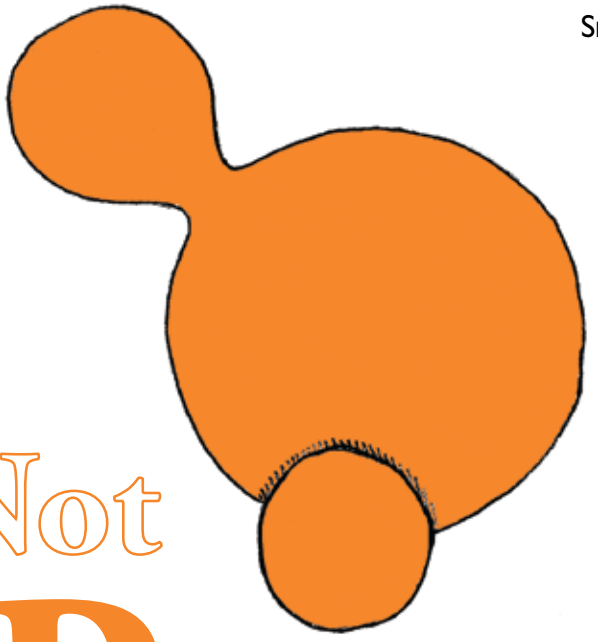


Why Not WiPower?

UF SPIN-OFF PROMISES TANGLE-FREE CHARGING

By John M. Dunn

Smartphones, GPS and laptops have allowed us to communicate and navigate from almost anywhere, but their insatiable demand for power has also kept us tethered to the wall — until now.

Just as WiFi freed us from telephone cords and modems, a Gainesville start-up company called WiPower — pronounced "y-power" — promises to free us from tangled bundles of chargers and cords.

In WiPower's world, you could toss all of your electronic devices onto a charging pad on top of your desk or built into your kitchen counter and they would draw just the amount of power they need, whether it's 60 watts for a laptop or 2 watts for an iPhone.

And WiPower's founders aren't all about convenience. They say wireless power is greener because it's more efficient and eliminates the need for billions of power adapters.

The Environmental Protection Agency estimates there are anywhere from 12 to15 billion power adaptors being used worldwide, or 2.5 for every person on Earth. A lot of cords and adaptors that quickly end up in landfills could be eliminated by a universal wireless charger.

In a world with 15 billion chargers, energy efficiency is a big deal. The Electric Power Research Institute (EPRI) estimates that the 2.5 billion power supplies in use in the United States consume at least 2 percent of all U.S. electricity. More efficient power supply designs could cut that usage in half, saving nearly $3 billion and about 24 million tons of carbon dioxide emissions per year.

WiPower says its prototype wireless chargers operate at about 60 percent efficiency, although the company says it has achieved higher than 75 percent in testing. By comparison, EPRI estimates most corded power supplies used in consumer electronics have efficiencies in the range of 30 to 40 percent.

The financial implications of practical wireless power are enormous. According to a 2006 Department of Energy study, the U.S. power-supply market is expected to reach $6 billion in 2010. And the world market may reach $30 billion. In addition, consumer electronics manufacturers could save millions more if they didn't have to include a charger with every device they sell.

The inspiration for WiPower grew out of founder Ryan Tseng's frustration at having to cart around bundles of chargers every time he traveled. It has evolved into a company that's been getting a lot of buzz in tech circles.

WiPower's booth was crowded at the 2009 Consumer Electronics Show in Las Vegas and it earned them a plug on NBC's "The Today Show," where anchor Ann Curry demonstrated lightbulbs illuminating as she dragged them onto the charging pad.

Illustration by Paul Mesal

As a UF engineering undergraduate, Tseng became so frustrated with all the different, tangled power chargers he had to carry with him when he traveled that he approached one of his electrical and computer engineering professors, Jenshan Lin, about possible solutions.

While the idea seemed simple enough, the engineering challenges were considerable. Over the next several years, Tseng, Lin, Zhen Ning Low and other students and faculty worked long hours developing a practical product.

Along the way they patented several aspects of their research and worked with UF's Office of Technology Licensing to recruit business professionals to their team and attract investors.

One of those investors was the Florida High-Tech Corridor Council, or FHTCC, which awarded the fledgling company a $100,000 matching grant in 2006 to continue Lin and his UF team's research. In 2007, the council provided more funding — this time a $150,000 matching grant — to support a research relationship between Lin's campus research team and WiPower.

Dating back at least to Nikola Tesla's experiments in the 1890s, scientists have known that a coiled device with electricity flowing through it will create a magnetic field that can induce energy in the coil of another nearby device. But there's a big difference between transmitting power between two giant electrodes in a laboratory and transmitting it between the wall and a cell phone.

"Wireless power has never been both technically and commercially viable," says Henoch Senbetta, WiPower's marketing director. "The trade-offs were unending."

But WiPower's engineers say they have figured out how to balance all of these trade-offs in a commercially viable system.

The key, they say, is a totally new approach to the electronics and the software to run the electronics.

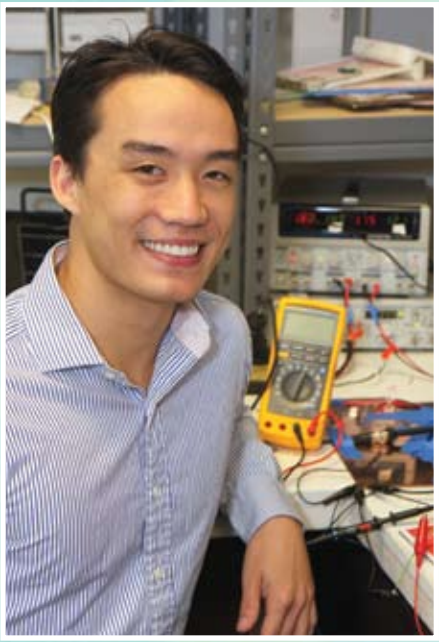
Of the various ways scientists have developed for transfer power between a transmitter surface and a receiver — inductive, radio frequency (RF) harvesting, resonant — WiPower chose "inductive coupling" because it offered the most power at the lowest cost.

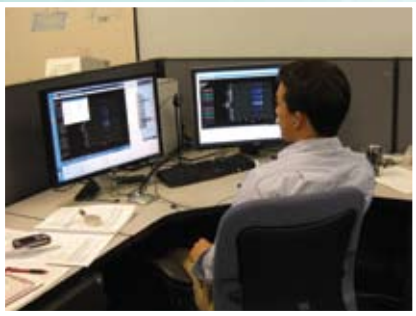
"WiPower realized that a coreless inductive wireless power system truly makes the most sense because it is an efficient, small, low-cost solution, while still being applicable to the wide variety of power requirements that our mobile devices have," says Senbetta.

A modern wireless charger needs two basic parts: a coiled transmitter that is plugged into an outlet and a coiled receiver. The transmitter emits magnetic waves that move in a characteristic manner. The receiver's coil, when placed near the transmitter, "tightly couples" with these waves and turns them into electricity stored in its batteries.

Commercial wireless chargers — such as those found in some electric toothbrushes — already exist. The trouble is that the toothbrush must be "aligned" in a port in a precise, prescribed way for the coupling process to work properly.

"The biggest issue for us," says Tseng, "was to come up with something that would allow a user to put multiple devices in any position on the charging pad and get them to recharge."





At WiPower's lab in the Gainesville Technology Enterprise Center, company founder Ryan Tseng (far left) and a team of engineers are addressing the many technical challenges in cutting the cord on electrical charging.

In typical entrepreneurial fashion, Tseng says the WiPower team "lived in the lab 24 hours a day. We slept under the lab table, showered at the gym, ate microwavable food and almost never saw the sunlight for a year."

By 2008, the team finally "got a handle on the situation" on the alignment challenge by redesigning much of the internal electronic architecture of the transmitter.

"The final product has stayed consistent with the original design," says Tseng, "but the technology underpinning it is not like we expected. At one point, we threw out about half of what we did in research and went down a new path. But it was a good decision. Today, we're the only company that has a charging pad that can charge multiple devices simultaneously without the alignment problem."

Unlike competing products, WiPower's charger does not use radio signals to communicate with a receiving device to determine how much energy the device needs. Instead, it "senses the signature of the voltage and current characteristics of the receiver," says company electrical engineer and researcher Ashish Gupta. This capability means lowers costs because there's no need for antennas and other components. There is also less electromagnetic interference and fewer design changes needed to keep up with the thousands of new consumer electronic products that hit the market every year.

"A typical laptop draws about 60 to 65 watts maximum, while a cell phone is anywhere from 2 to 2.5 watts," says Gupta. "We've come up with a coil design for the transmitter that creates an even field of energy across the pad."

WiPower is preparing to take its charger to the electronics consumer market and plans to start production by the end of 2009.

"Our objective," says Tseng, "is to have original equipment manufacturers integrate our technology into their appliances, so they would be compatible with our charging pad."

Because the company didn't want its business model to be completely reliant on the manufacturers, it is also developing a way for consumers to "retrofit" their existing electronic devices with WiPower receivers to make them compatible with WiPower's charging pad.

In addition, WiPower is developing military and industrial applications of its technology. Recently, the Department of Defense awarded the company a $70,000 grant to work on a wireless power pack to help soldiers in the field.

"American military personnel often have a lot of equipment to carry around," says Tseng. "Soldiers in combat have been known to become ensnared in their cables from night vision goggles and other gear, which often puts them in danger."

A central, battery-operated power pack that wirelessly recharges all devices simultaneously could save lives, he says.

WiPower officials predict that one day wireless power will be ubiquitous, available to users in glove compartments, hotels, airports, coffee shops, cafés and other public places, just like WiFi.