

Next Little Thing 2010



PHOTO: PETER YANG



PHOTO: PETER YANG



COURTESY: K9 STORM



COURTESY: EMOTIV



PHOTO: JEFF MINTON

(Fortune Small Business) -- It's 8 a.m. in a San Diego hotel ballroom, and the annual DEMOfall conference is under way. VCs and journalists stifle yawns and peck at laptops. After a morning of scripted pitches by startups that promise to "integrate smartphone remote mobile applications" or "monetize social networks by enabling live social interaction around content," the coffee break can't come soon enough.

Then Jason Carlson of Emo Labs, a last-minute addition to the schedule, wheels a TV and a set of giant speakers onto the stage. They're playing the Beach Boys. Carlson whips the speaker box off to expose a sheet of clear plastic, which is producing the sound.

Suddenly no caffeine is required, no jargon necessary. Emo has invented invisible speakers. There are audible gasps. Dozens of digital cameras flash at once. Those same jaded observers start cheering.

"I didn't think I could give a good presentation that wasn't one-on-one," Carlson tells me later. "I was worried I was going to be a failure." Emo goes on to win \$500,000 and the conference's DEMOGod title.

By some measures, these are lean years for commercial innovation. In a recent *Fortune Small Business/Zogby International* poll, just 19% of small business owners said they aimed to introduce a new product or service in 2010; that's an 8% decline from a year earlier. Among those looking to launch, a sizable majority -- 77% -- described their product as an "incremental improvement" rather than "game changing." Like those scripted startups at DEMO, most entrepreneurs seem to be playing it safe.

But look closely at the few who are innovating -- and at the products that make you go *ooh* -- and another narrative emerges.

Hardware is back with a vengeance. Most successful products coming out of small tech companies in the early 2000s were Internet plays, like Google ([GOOG](#), [Fortune 500](#)), Facebook or Salesforce.com ([CRM](#)). That territory has now been thoroughly mined. The most exciting products of 2010 will look a lot more like ... well, like the breathtaking science-fiction stuff we always expected from the 21st century.

This, our sixth annual Next Little Thing feature, examines four companies whose products have the potential to revolutionize how we work and play. Apart from Emo Labs, there's WiTricity, which is making electricity as wireless as Wi-Fi; Plastic Logic, whose flexible electronic reader is a generation beyond Amazon's Kindle; and Emotiv, whose headset reads your brain, letting you control a computer without touching it.

Despite the diversity of their products, these companies have much in common. All were founded by scientists who did groundbreaking research during the 2000s. In all four cases, the founders recruited business leaders with the chops to commercialize their ideas. All are ambitious, yet modest

enough to know they can't grow without hundreds of developers and equipmentmakers. And all have one major hurdle to overcome: mass skepticism.

As Eric Giler, CEO of WiTricity, says of being headhunted by the company: "I thought, 'Well, this is impossible. But if it's true, the world will change.'"

At the offices of [Emo Labs](#) in Waltham, Mass., the receptionist's desk and the meeting rooms look like an afterthought. The real action goes on behind a glass wall in a warehouse space where most of the 15 employees are soldering wires or fiddling with knobs on machines with sine-wave displays. For a visitor used to Silicon Valley startups with programmers staring at screens or frolicking at foosball tables, this is refreshingly old-school stuff.

CEO Jason Carlson points out the testing chamber that his team built by hand from foam and wood. Then he stops and taps at what looks like an ordinary photo frame on a desk.

"Imagine you're in your office and you need to make a conference call," he says. "You can connect your cell phone to this frame using Bluetooth, and suddenly your call is coming from it, clear as a bell. Wouldn't that be cool?"

For the past 80 years, all loudspeakers have been based on roughly the same idea: A magnet creates force that causes a diaphragm to vibrate, producing sound. The quality of the sound varies with speaker size, but modern TV and computer-monitor design has forced speakers to get smaller and smaller. As a result, many tube TVs from the 1970s sound better than modern flat-screen TVs.

In 2001, Lewis Athenas, a loudspeaker designer working for Boston Acoustics, saw that consumers were increasingly playing music on their computers. He was nonplussed by the weedy sound from most desktop speaker systems. Then he discovered that by replacing the speaker magnet with a kind of ceramic known as a piezo actuator, he could make a computer screen act as the diaphragm. Put a thin strip of ceramic down each side of a see-through plastic membrane, and you've got stereo sound.

Athenas went to work in his garage. In 2005 he finished his first working prototype, a wooden frame around a 15-inch monitor. That same year he founded Emo Labs (Emo stands for "edge motion") and raised \$15 million from local venture capital firms.

Now just about any electronic device with a screen -- a laptop, a cell phone, the latest and thinnest LED TV -- can also be a speaker. Want better audio in your car? Wait till you hear it coming from your windshield. Like watching movies at home? You'll love it even more when the dialogue actually comes out of the actors' mouths.

At Emo Labs, Carlson played me a DVD of jazz singer Diana Krall performing live in Paris. The music came through loud and clear, with rich bass tones. "Touch it," Carlson urged. "Feel the vibration of the screen. That's what the sound is."

Carlson left the CEO job at Semtech, a semiconductor manufacturer in Camarillo, Calif., and joined Emo Labs in 2006. He wanted to adapt the semiconductor-industry model of producing standardized components and selling them to equipment manufacturers. So Emo spent the next few years testing equipment, getting a toehold in China and Taiwan, and persuading naysayers at the equipment firms.

"I can't tell you how many times we've sat in front of engineers, and they keep asking, 'Where's the sound coming from again?'" says Carlson. "It's like their minds don't want them to believe it."

The company is tight-lipped on pricing and on which electronics giants it has struck deals with. Those companies should make their own announcements in the first half of 2010. (The products will not carry Emo Labs branding.) Carlson says the technology will add about a 10% price premium, so consumers should pay \$100 more for a \$1,000 TV equipped with Emo's speaker.

Electronics firms have been deep-discounting their products for some time now, and even Carlson admits they are wary of any technology that could drive up the price of their products. Still, given that 160 million flat-panel TVs and 150 million laptops were sold in 2009, even a tiny slice of that market would be lucrative for Emo.

And that's not counting the global loudspeaker business, set to hit \$4.2 billion in 2010, according to research firm Electronics.ca. Carlson recently installed conventional speakers throughout his house. Wiring and tearing into walls cost more than the sound equipment, he says. "It would be beautiful if you could just use picture frames in each room," he sighs. "Especially if they were wireless."

To that end, Emo Labs has met with a company 20 miles down the road, near MIT. Its name is WiTricity.

Marin Soljagic couldn't sleep. The problem was his wife's Nokia cell phone. The tyrannical device beeped on the bedside table when it needed to be plugged in. It could not be disabled.

Instead of taking a hammer to the phone, Soljagic marveled at the fact that this device, and billions of others like it, was sitting a few feet away from all the electricity it could ever need. Why couldn't it receive power wirelessly, just as laptops get Wi-Fi?

Being a physics professor, not an electrical engineer, Soljagic didn't know the history of failed attempts to produce wireless electricity. (Thomas Edison and his rival Nikola Tesla were among the first to envision long-distance power-beaming.) Soljagic also didn't pause to consider conduction, the kind of close-range charging used in electric toothbrushes, which is about as far as wireless electricity got before him.

Soljagic learned that if you could get two magnetic fields to resonate -- to sing the same note, in effect -- they could transfer an electric current. With two large magnetic coils, he found in an experiment described in *Science* magazine in 2007, you can throw 60 watts across a room,

powering a lightbulb. (Keeping the two resonators in perfect harmony over a distance is not simple; Soljagic spent several years running lab experiments before he built a system that worked reliably.)

MIT, his employer, quickly patented the technology (Soljagic's name is on the patent) and encouraged Soljagic to start a company. He would sit on the board but find executives to run it full time. The result can be found on the second floor of a brick building in Cambridge, Mass. leased to the company by the big-and-tall tailor on the ground level.

WiTricity's 15 employees are hard at work proving that Soljagic's magnetic coils can power almost any electrical device. David Schatz, director of business development, shows me a TV, a DVD player and a computer, all of them wireless.

"This was our No. 1 request from business users," Schatz says, switching on a projector. "Look: no batteries, no wires, nothing up my sleeve." The coil sending out the power is hidden behind an abstract painting that the CEO's wife rescued from their basement.

Schatz is the first to admit that the housing they've hurriedly built for the receiving coils is too bulky. "No one would want to buy this," he says, pointing to the pack that juts out from the back of the laptop, a pregnant plastic bulge that's about a third as large as the device itself.

Given sufficient cooperation from equipment manufacturers, WiTricity is confident that it can incorporate its coil into the guts of any device. (Think of how computermakers like Apple ([AAPL](#), [Fortune 500](#)) turned bulky Webcams into fingernail-size lenses that fit in a thin laptop case.) CEO Eric Giler, a veteran tech executive who ran a telecom company for 22 years, understands the importance of letting potential partners play with patented technology.

So far about a dozen companies -- including Intel ([INTC](#), [Fortune 500](#)) and Sony ([SNE](#)) -- have tried replicating Soljagic's groundbreaking MIT experiment in their own research facilities, just to make sure it's the real deal. That might make other CEOs nervous, but not Giler.

"Our best customers are going to be the guys who try to do this," he says, "because it is really hard." The company is also talking to furniture manufacturers about fitting coils into desks and cubicle walls. The first announcement of a WiTricity partner product is expected toward the end of 2010.

Most of Giler's potential customers have one major question: safety. "There's a real perceptual problem," he says. "People think we're putting electricity in the air, and that's called lightning, and they know to stay away from that."

In fact, the coils turn electricity into magnetic fields, then back into electricity. And as any physicist will tell you, magnetic fields interact weakly with humans; as far as the fields are concerned, we are no different from air. (The Earth itself exudes a magnetic field.)

Initially, Giler was skeptical. Magnetism from MRI machines can disable pacemakers. Wouldn't wireless electricity pose similar risks? Soljacic replied that MRI magnetism is about 10,000 times stronger than his version. The Institute of Physics in London concurs: WiTricity's magnetic field "has no detrimental effects on the human body."

Giler makes a point of standing between the coils whenever he demonstrates the technology. At the Nikkei electronics conference in Tokyo in October, he was able to power a 1,000-watt klieg light from across the room -- a far cry from that 60-watt lightbulb in Soljacic's first experiment. "We're going up the power curve," he says.

WiTricity's record so far is 3,000 watts -- enough to fully charge an electric car, so long as it's in the same room (or garage). How big could WiTricity get? "Every single person in the world can relate to the problem of running out of batteries or having wires everywhere," Giler says. "The market is so potentially huge that numbers become meaningless."

A wireless electric world could free up designers to create entirely new kinds of products, no longer hemmed in by the need for boxy batteries or power supplies. As one of Giler's VC investors says, "I bet you that's your bestseller in five years' time. You don't even know what it is yet."

One product that already looks set to evolve out of all recognition is [Plastic Logic's](#) much-anticipated electronic reader, the Que, which the Mountain View, Calif., company plans to release in January 2010.

On the surface, much about the Que seems familiar. Like Amazon ([AMZN](#), [Fortune 500](#))'s Kindle -- a \$350 e-reader that has sold more than 500,000 units since its launch in 2007 -- the Que displays pages in grayscale E-Ink, designed to be easier on the eyes than conventional screen displays. Like the Kindle, the Que will allow users to download books and magazines wirelessly (via AT&T ([T](#), [Fortune 500](#)); the Kindle uses Sprint ([S](#), [Fortune 500](#))). To counter Amazon's giant library of downloadable books, Plastic Logic has inked a deal with Barnes & Noble. It will also fetch digital versions of publications such as *USA Today*, for a subscription fee.

Like the iPhone, the Que features a single physical button that takes you to the home page. Instead of the Kindle's awkward keyboard and page forward/back buttons, it has a pop-up touch-screen keyboard and navigates pages with the flick of a finger.

But that's where the similarity to current e-readers ends. To see what's new about the Que, look under the hood: There's no silicon in the screen. All its transistors are made of plastic. This is the result of years of research by professors at the Cavendish Labs in Cambridge, England. Five years later this research yielded an e-reader that is fundamentally flexible, unlike the Kindle, with its breakable glass screen.

Soon after the company launched in 2007, CEO Richard Archuleta built an international organization. The research arm stayed in Cambridge, but every other business function was sent

abroad: manufacturing moved to Dresden, Germany; assembly, to Taiwan; and headquarters, where most of the employees work, to Silicon Valley, the better to poach local talent.

"It's very easy to get engineers excited about joining this company," grins Archuleta, the former head of Hewlett-Packard (HPQ, [Fortune 500](#))'s notebook business.

Disappointingly, Plastic Logic has played it safe by encasing the flexible screen in a more rigid plastic case. "We did prototypes that were rigid on one end and floppy on another," says Anusha Nirmalanathan, Plastic Logic's product manager. "We found users had trouble getting used to that."

Still, the Que retains a significant "wow" factor. It is legal-paper size but weighs a mere pound, three ounces less than the comparable Kindle DX. Plastic Logic regularly drops the Que on concrete, and it survives. The battery will last for days on a single charge. Plug it into your computer and you can download any PDF or text file. The device can hold thousands of PDFs and tens of thousands of books.

Archuleta is pitching the Que squarely at business users. It will offer the ability to annotate documents. You can type on virtual sticky notes or draw on the screen. (The Kindle can do none of these things.) The Que's price point hadn't been announced at press time but will likely fall between \$400 and \$800.

That's too rich for some analysts. "The magic number for an e-reader is \$199," insists Allen Weiner of Gartner Research.

Win or lose with the Que, Plastic Logic's research continues. It is developing color e-reader technology with a grant from the U.K. government. It hopes to launch a color Que in 2011. Archuleta has proposed a military application: a foldout map that could be wirelessly updated in the field.

"You will see bendable, foldable, rollable readers," he says. "Whatever the marketplace wants."

Plastic tendrils are clutching my temples, reading electric signals from my brain. I'm sitting in a conference room in San Francisco looking at an orange box floating on a large flat screen. My goal is to make it disappear using nothing but thought. "Cheshire cat," I think, and the box starts to fade.

No, I haven't turned into the Mad Hatter, though the device I'm wearing may make me look like one. I'm trying out the Eloc headset, made by a company called [Emotiv](#).

Earlier I calibrated the Eloc by thinking of commands for the orange box when the program asked for them: move left, move right, rise, drop, stop. For disappear, I thought of Lewis Carroll's vanishing kitty. The Eloc just proved it can remember which areas of my brain lit up while I did that.

"Electric information from the brain is broadcast on the inside of the skull, which is how the headset picks it up," says Tan Lee, president of Emotiv, via a videoconferencing system. (Like the company's

10 research scientists, she is in Sydney; 20 employees work in San Francisco.) "By the time it gets to the skull, that information looks very different from the way it does on an MRI scan. So we basically had to unfold the cortex to learn how to read it."

The \$299 Epoc headset launches in early 2010, along with the Windows software that calibrates it. Emotiv's four scientist-founders hope to make it the basis of a whole new system of computer game playing: "Pressing a button to cast a magic spell doesn't give you a fulfilling experience," Lee explains. "But thinking that spell does."

The Epoc's tendrils are set to stretch far beyond games. Emotiv has received requests for developer kits from 10,000 software engineers around the world. Applications have been suggested in industries such as aerospace, education and healthcare. Some people with disabilities are already using the Epoc to control their wheelchairs.

The most fascinating -- and disturbing -- thing about the Epoc is that its software can read emotional states like anxiety, frustration, excitement and engagement. In the calibration software, they are shown rising and falling on a graph in real time, like seismic readings. The idea is that game designers will be able to adjust the difficulty of a given level if you're frustrated, or change musical tempos depending on your excitement.

As with all transformative technology, the Epoc's mind-reading abilities are bound to have unintended consequences. I couldn't ask a question in my interviews at Emotiv without my anxiety level rising on the graph. The days when journalists can smile through dull pitches while keeping their real feelings hidden may be numbered.

Play-it-safe startups, you have been warned.