Producer’s Notebook: 3-D printing, the overnight hit that took 3 decades

by Stephanie Becker (/profiles/b/stephanie-becker.html)

You never know where the danger lurks in any given story.

When our contributor Kosta Grammatis and I got assigned a story on 3-D printing, I started hyperventilating. Kosta did a little eye roll: “It’s like doing a seven-minute story on cars,” he said. But that was the problem. How could we possibly winnow down a topic that has absolutely exploded at twice the rate of Moore’s Law? (For those in the dark — as I was — Moore’s Law refers to the fact that technological growth doubles about every two years.) However, we managed to link stem cell research, a bakery, a loudspeaker, the Statue of Liberty and a pint-sized Darth Vader all into a piece about 3-D printing.
3-D printing is estimated to be a $2 billion business now and is expected to be $4 billion in 2015. The first 3-D printer was built in Texas in the late 1980s. Since then, the technique has mostly been used for making prototypes for industry — car manufacturing, aviation, architecture and medicine. It has made testing products faster and working out the kinks easier. You could print intricate structures all in one swoop — although that swoop can still take as long as a day. 3-D printing is definitely not for mass production, although now it is for production by the masses. But in the public's imagination, it didn't really take off until about five years ago (an overnight technological sensation almost three decades in the making).
The most basic 3-D printer is a little like your home printer, but on steroids. Instead of dropping ink on paper once, it drops plastic or metal or any kind of goop, layer after layer, building up into an object. It’s kind of like dripping a sand castle at the beach. Except the finished product doesn’t get swept away at high tide.

“3-D printing changed around 2005 when Cornell University Professor Hod Lipson built a 3-D printer in his lab — one you could build at home.”

Until the mid-2000s, unless you worked in an industry that used 3-D printing, hardly anyone had an idea what it was. It all changed around 2005 when Cornell University Professor Hod Lipson built a 3-D printer in his lab — one you could build at home. He made it open-source. Then he and his peeps made their computer designs open-source too. And that opened up the floodgates. Now, for a couple of hundred to a couple of thousand bucks, you can buy a printer and make stuff at home — mostly toys and trinkets or an iPhone cover or replacement parts for stuff like your busted stroller or that knob that always breaks.

We went up to Cornell to talk to Lipson about his latest breakthrough: a 3-D-printed loudspeaker. It’s a big deal, because what’s usually printed now is just stuff that sits there like a lump. You can print jaws and car parts and jewelry and toys and coral and bikinis. But nothing really *does* anything.
A 3-D printer at Cornell University builds the custom speaker.

Lipson and his lab rats have made something that does something. And the loudspeaker works. Lipson says the problem with 3-D printing is that there’s no killer app yet, no “How did we not think of that?” application. It is the future. Although what he seemed most excited about when we were there was the latest in 1844 technology.
Shortly after we arrived, a very official-looking guy with a tightly locked wooden box walked into the lab. He set it down, carefully unlocked it. With white gloves and total reverence he lifted out the object inside. It was the original telegraph receiver, now 170 years old. Its owner was Ezra Cornell — for whom the school is named. You might be more familiar with the guy who sent him the first message: Samuel Morse. “What hath God wrought?” Morse asked in dots and dashes. Today those dots and dashes are DOA, but the school that bears the name of the receiver's owner has wrought the promise of lifesaving technology.

And that took us to our next stop. Directly across campus from Lipson’s lab is the Butcher Biomedical Engineer Lab. There they're working on a 3-D-printed pediatric heart valve. While it's at least 10 years away from clinical trials, our guide through the process was so engaging, you couldn't help but be infected by Laura Hockaday’s enthusiasm.
A 3-D-printed heart valve.

She was absolutely giddy at the prospect that someday a 3-D-printed heart valve infused with an infant's stem cells could save a child with heart valve disease. Right now, children with heart disease get artificial valves that don’t grow as the children do. That means these kids have to be cracked open for heart surgery several times as they grow. When Kosta interviewed Laura, she confessed that what she was doing is fun — but it’s not all about the fun. She did, however, have this twinkle in her eye as she talked about the responsibility of saving lives.
It was the mother of one of those kids who was poised but emotional. Jennifer Page is mother to now 9-year-old Max. You might remember him as the pint-sized Darth Vader from a Volkswagen commercial that aired back in 2011. It was the most highly rated Super Bowl commercial in its time. Max has had eight surgeries since birth for his heart disease. And when we told his mom about the work Laura is doing, she demanded Laura’s email. She wanted to thank her for her work. Jennifer was definitely choking back emotion when talking about what a difference Laura’s work could make for her son — even if it is 10 years away. I really think Laura doesn’t get how awesome and life-altering her own work is going to be.

But I guess it’s hard for her to take it all so seriously when day after day you watch a 3-D printer and worry about whether the consistency of your product is more applesauce than peanut butter. Peanut butter, by the way, is better than applesauce — which would turn the valve into a puddle of agate and stem cells rather than a 3-D valve.

And speaking of food, I'd guess that Kosta's favorite stop on a 3-D printing adventure was the Sugar Lab in Los Angeles, where they're printing sugar confections. Their goodies come out of the printer in a big iceberg of powdery sugar that then has to be blown off to reveal the actual design. To do it, you put the block of sugar into an “excavator” and zap it for a few minutes with an air-spraying nozzle. Normally you keep the excavator cover closed.
But I'm a producer, and it's my job to make sure you can see what's going on — so I made them take the cover off. Sugar dust blew all over the place. Kosta noted it was the best air he'd ever breathed in, but he worried about what it was doing to his lungs.

"It's all about the shot!" I barked. A remark for which I was soon to be punished. How? I had taken off my shoes because my feet were killing me. Because the floor was now covered with a fine coat of sugar dust, the soles of my feet soon were caked in sugar. So I put my shoes back on. My sugar-covered feet were just about glued to my shoes. As the shoot progressed, those sugar feet warmed up and
turned the sugar into syrup. While I gamely tried to maintain stability, I slid around my fashionably high but uncomfortable shoes now filled with sugar soup until — you guessed it — I took a header right into a Sugar Lab wall. The perils of 3-D printing.

I need to get some 3-D-printed comfortable shoes.

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