

# Power (of electronics) to the people

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An example of the Bits modules. Here, a power source (blue) connects to a button (pink) that will trigger a motor (green). The orange modules to the side are extending wires. Credit: : LITTLEBITS

MIT Media Lab alumna and entrepreneur Ayah Bdeir SM '06 wants to help all people worldwide, tech savvy or not, understand and build creatively with electronics.

It's the ambitious mission powering her fast-growing startup littleBits, which sells a library of small modules (called "Bits modules") integrated with electronic functions—such as lights, sounds, and motors—that snap together with magnets for do-it-yourself (DIY) prototyping.

"The mission is to put the power of electronics in everyone's hands," says

Bdeir, the littleBits CEO who founded her company in 2011 based on an open-source-electronics concept that took shape years before at MIT.

The New York-based company, which recently closed an \$11 million funding round and has sold hundreds of thousands of "Bits modules," has caught media buzz and earned praise in technology and entrepreneurial circles across the globe.

As an open-source company, littleBits—which provides its circuit diagrams freely on its website—has also positioned Bdeir as a pioneer of today's "maker movement," a rising culture emphasizing DIY hardware and technology.

Bdeir has been involved with the movement since its early days: Back in 2009, she co-founded the annual Open Hardware Summit, which was held last year at MIT.

Now, as a "maker" pioneer, Bdeir aims to help "democratize" electronics, shifting the power of invention from experts to the public. In a way, Bdeir says, it resembles how 3-D printing enabled small-parts manufacturing at home, and how advancements in computer technology allowed people to create their own games and software.

"Big technologies that have transformed our society have typically started in the hands of experts and large companies, and then someone democratized them into the hands of everyone," she says. "So that's what we're doing for electronics."

Last year, Fast Company named Bdeir one of the 100 most creative people in business. The startup itself has earned numerous awards from family, design, and technology organizations.

## **Next-generation Legos**

Dubbed "Legos for the iPad generation" in various media reports, the company's electronic-integrated "Bits modules" are square-inch, color-coded plastic chips with tabs that hold the connecting magnets. Blue bits are power sources, such as USB and coin-battery power; pinks are inputs, such as sensors and triggers; greens are outputs, such as buzzers, lights, and fans; and oranges are extending wires.

There are more than 50 bits (up to a dozen in each category) that, according to the company, can combine to create more than 150,000 different circuit combinations.

Children and adults can use littleBits to create original projects such as motorized toys, interactive art displays, flashlights, and even musical instruments (with a newly released Synth Kit that enables professional and amateur musicians to make their own modular synthesizers). But littleBits also provides instructions on its website for devices, such as a motorized mount for an iPhone that tilts and pans, or small robots that serve food and drink.

As they build, littleBits users better understand electronics. "It's an easy, easy way for kids to get started on electronics and making interactive objects. But we take care to not dumb down the electronics in any way for adults," says Bdeir, who spent her childhood playing with Legos, and electricity and chemistry kits.

Bits are sold individually kits that contain anywhere from 10 to 45 bits. Although most customers are parents with kids or educators who use the devices in their classroom, Bdeir says a growing number of engineers, artists, and entrepreneurs are using the modules for early prototyping. "It's a diverse crowd," she says.

Since 2012, New York's Museum of Modern Art has been using bits to power 4-foot-tall kinetic sculptures made of wood, cardboard, and

acrylic displayed in its shop window.

## **Combining creativity and engineering**

Despite her entrepreneurial success, Bdeir never actually set out to start a company. littleBits was about realizing a dream that took shape while Bdeir was a student in the Media Lab, which, she says, "changed my life."

As an undergraduate at the American University of Beirut, Bdeir focused on computer engineering, but found the subject "dry and uncreative," so set out to study business. During an internship in Boston, she visited the Media Lab, where she saw "the huge power that comes from combining creativity with engineering."

Inspired, she enrolled in the computer culture program and joined the Media Lab's Computing Culture Group, then led by Chris Csikszentmihalyi. There, she worked on the Number 6 project, a platform that enables electronically inexperienced artists and designers to create computational artwork using microcontrollers.

That experience led her "to think about technology as a creative tool, as a form of expression, as something that you can reinvent," she says. Coupled with her independent work—which focused on tinkering with wearable devices and robotics, and designing interactive spaces—she became fascinated with the process of building and inspiring others to build.

"At one point, I became more interested in the tools than the product and the outcome," she says. "I got interested in, 'How do you put a powerful tool in the hands of people that are not experts? How do you enable an artist to use lights, or enable a designer to prototype with sound and sensors?'"

But this broad concept—to bring electronics to the masses—wouldn't manifest itself as littleBits until 2008, when the idea became unshakable. "It was a problem I was trying to solve and became obsessed with," says Bdeir, who was then a fellow at New York's Eyebeam Art + Technology Center.

## **Building littleBits**

In between her fellowship, teaching technology and culture at New York University, and founding a "hackerspace" in her native Beirut, Bdeir developed crude prototypes for littleBits: pieced-together cardboard blocks equipped with copper tape and soldered-on electronics.

As time went on, the designs evolved: Bdeir made advanced circuit boards, tweaked the magnetic connectors, and revamped the designs. More than 20 prototypes and three years later, she had come to a viable product and issued a factory-made prototype. She tested the waters at various technology conferences, such as the Maker Faire, a national conference that showcases arts and DIY technologies. Encouragement to commercialize came quickly, and unexpectedly.

"Every once in a while the press would cover it or I'd bring it to Maker Faire and people would mob the booth, and that encouraged me to keep going," she says.

In December 2011, her first order of hundreds of kits arrived—and sold out in two weeks.

Throughout 2012, Bdeir expanded her team and the company ramped up production out of its Greenwich Village headquarters to meet demand. In that time, Bdeir made one key business decision—to immediately ship internationally, which can be difficult for a fledgling startup.

This decision not only contributed to the rapid rise of littleBits—which now ships to more than 60 countries—but supported Bdeir's original vision of a universally accepted product. "Since day one, it had to be something that appealed to people independent of their gender, nationality, or language," she says. In that way, it also encourages young girls to engineer, she says.

Although Bdeir initially shifted focus only grudgingly from her engineering passion to business strategy, she's accepted her new role as CEO, with a team of 30 now helping to craft her vision.

"Something was once a sketch in your head and suddenly it took life and has legs and people are taking it to places that you never thought of," she says. "It's very rewarding."

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