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## The Internet of Things: 2017 & Beyond

Daphne Stanford · Wednesday, February 1st, 2017

The future face of the Internet of Things (IoT) looks to become more connected than ever. In addition to ensuring the connectivity and remote access capabilities of many everyday household and office items, security will be a top concern for programmers and designers of these items as well. Part of the problem is the rate at which the IoT is growing—that is, exponentially. The fast rate of growth coupled with the continued presence of hackers in search of security breaches potentially makes for an especially vulnerable situation. Manufacturers of these products must assure consumers that their information and their property is secure and not prone to cyberattacks.

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Apparently, it's relatively easy for hackers to gain control of your IoT-based appliances, car, or thermostat. With the help of a few savvy coding skills, hackers recently gained access to a smart thermostat using ransomware, turning it up to 99 degrees until they were given $300 in bitcoins. Only then did they allow the owners to regain control of their thermostat. According to the hackers, it was "so easy" to deliver ransomware via the Internet of Things (IoT). Moreover, security researchers recently sent a drone flying over Austin, Texas, and were able to detect nearly 1,600 Internet-connected devices. Almost every device, moreover, was potentially vulnerable to hacking—for example, door locks, alarm systems, and lighting systems.

Both of these examples point to a dire need for IoT-connected devices to be more secure. Business Insider recently provided a list of tasks to check off, before purchasing an IoT device for your home. They included, among their ten recommended best practices, the advice to conduct research before purchasing a smart home product, changing the password for your smart home devices often, securing your router, and creating a separate network for your IoT devices. The list reminds us that there are steps we all can take to prevent our devices from being too vulnerable—even if they're not completely immune to all attacks.

Another concern is the growth of smart cities and mega-cities—that is, cities with more than 10 million people: in 2014, there were 28 megacities, but by 2030, that number is projected to grow to 41. Because of this, our economy will need to expand to support the quickly-growing population. We will experience a surge in the need for software developers, coding technicians, and IT specialists. Apparently, 4.5 million developers will be needed by 2020, changing the face of our cities via the permeation of IoT and the 'smart city' designation. That's a lot of software developers and a lot of connectedness! One possible solution to this need for so many IT specialists

is coding boot camps, which are already proliferating, throughout the country.

Of course, more traditional K-12 education needs to be devoted to getting students interested in STEM-related subjects like math and science. One key to doing so lies in educating the educators, so to speak. To this end, the White House launched the "Educate to Innovate" initiative, designed to "improve the global competitiveness of American children in the areas of Science, Technology, Engineering, and Math (STEM) education." The need for this initiative exists in part because, although the U.S. was a leader in invention and ingenuity, we've since lost our place in line, so to speak, compared to other countries that excel at education in general, and STEM-related education, in particular—Japan, Switzerland, and Ireland, for example, according to Pew Research Center.

In addition to our standing, in relation to other countries, we also need strong STEM-related education in order to sustain our economy—especially since so much technology is in the process of becoming central to so many of the products soon to be on the market, the Internet of Things being a prime example, of course. Part of that strong education background is dependent upon seeing beyond narrow subject-matter-based lessons and returning to more interdisciplinary learning. For example, Chris Aviles writes about how he has combined humanities-based subjects with math and science in his kitchen—or what he's renamed "The Innovation Lab."

This kind of real-world learning is not only more practical, but it allows students to understand subject matter in a genuine, tangible way that transcends textbook-based learning and narrow, subject-specific inquiry. The separation of subjects mirrors what happens at the postgraduate level with increasing specialization—especially when it comes to science-based subjects. This type of narrowing, however, simply doesn't reflect the complexity of the real world, as we know it. Rather, it merely reflects the specificity of academic journals and science departments.

In order for education to reflect the 'real world,' so to speak, it should incorporate technology like the Internet of Things. Joe Peters speculates about the potential impact of IoT on education in a recent article published on Geek Time, arguing that its influence will extend beyond business to find a home in the online and blended education arenas—as well as in traditional education. Technology is proving to be an increasingly effective way to connect to students, in part because young people are now so frequently exposed to technology at a young age. Peters points out that IoT devices are not only teaching tools but also may be used to help track students' progress and performance, allowing teachers to provide one-on-one instruction in real time, as well. Moreover, teachers can connect and collaborate with each other, via cloud technology.

Christa Flores also argues for the benefits of having students solve real-world problems using holistic, concrete situations that challenge them to think creatively and 'outside the box,' so to speak. There's a call, then, to allow students to invent and design things in the classroom—as opposed to simply asking them to answer multiple choice questions on standardized tests. Could this more holistic approach to teaching be one of the keys that allows students in the U.S. to "move from the middle to the top of the pack in science and math," as was put forth as a goal by the Obama administration, just five years ago? Back to the Internet of Things, however: how will business, specifically, change, as a result of IoT-connected devices? So far, we've tended to think of IoT-connected devices in relation to home-based life, as related to Google Home and Amazon Echo. What if, however, your business strategies changed as a result of IoT?

Jayson DeMers points out a few ways our business practices will be affected by all this technology, starting with the massive amounts of data we'll be faced with. This will come as a result of smart

devices tracking and recording patterns of consumer behavior, at different stages of the buying cycle. The Internet of Things will affect how remote workers connect into work-based networks, as well as increasing speed and productivity. There will be not only new staffing needs, such as experts in IoT technology suddenly being in demand, but also new consumer needs since 'smart' devices will soon be considered the new normal.

Perhaps ultra-connectedness will indeed become "the new normal." If so, STEM-related education and IoT-connected devices may no longer be constrained by certain times and places, but rather will eventually become integrated into our everyday existences—both at home and at work. Let's try to find ways that IoT can help us, rather than allow dystopian fears and visions to control our willingness to incorporate IoT into our everyday lives. It's unlikely that the IoT-robot-pocalypse is coming, anytime soon.

**Image Source:** Tumitu Design

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