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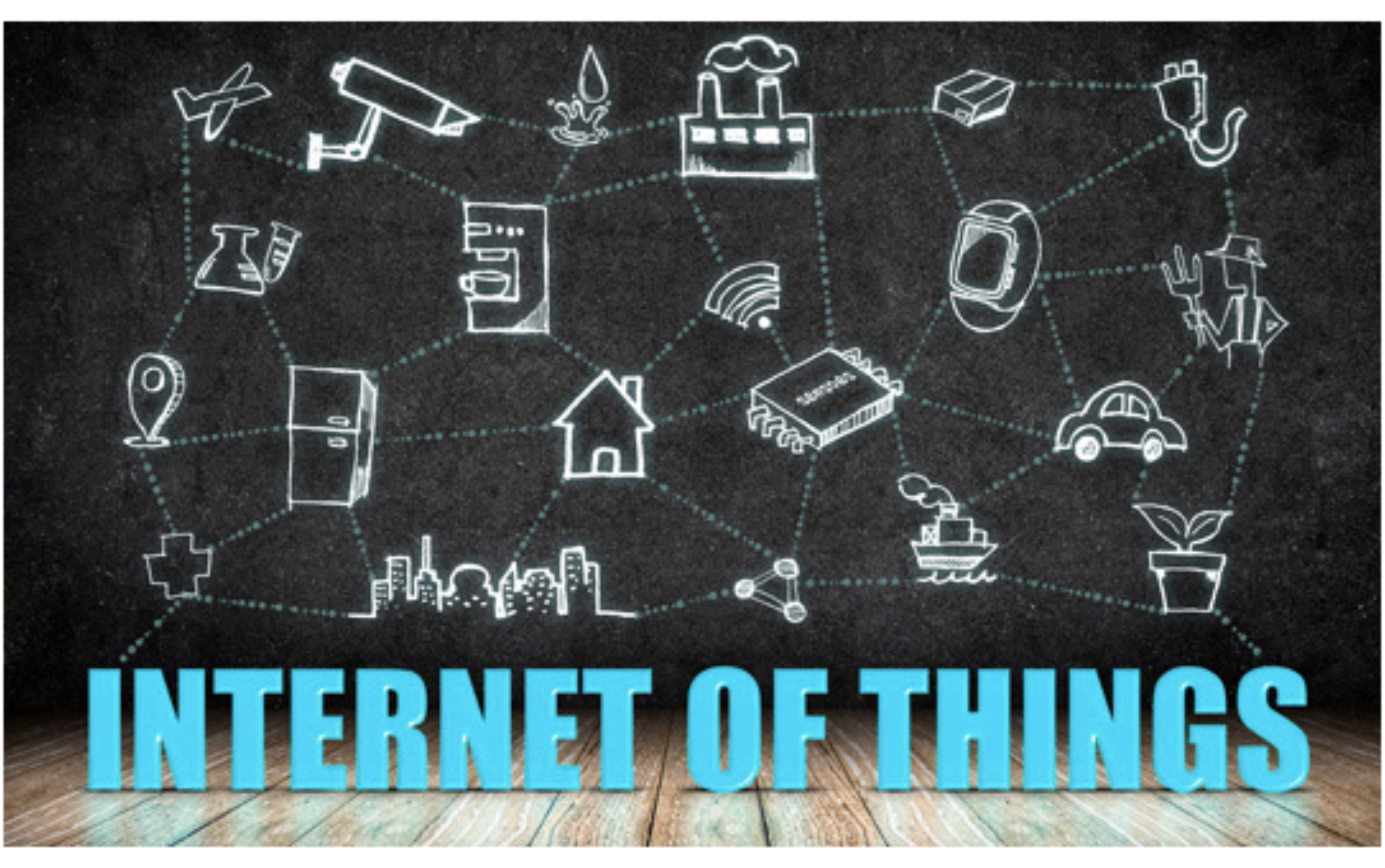
The Internet of Things Raises the Stakes on STEM Education

by Lisa Hook September 21st, 2015



Imagine if the objects around us were interconnected to exchange information and allow us to monitor and control them remotely. In that scenario, the things we use in our personal and professional lives—home appliances, industrial equipment, medical devices, you name it—would all communicate in real time through a complex network of electronics and software. As much as it might sound like science fiction, this Internet of Things (IoT), as it's known, has already started to play out and promises to become widespread. We see signs of it in a wide range of industries, from data-driven farms to cars that are Internet-connected and self-driving. In fact, this year alone there will be nearly 5 billion connected things, according to Gartner, with the number expected to increase to 25 billion things by the end of this decade.

Right now, many of these connected devices provide us with simple conveniences, like turning on our air-conditioning with a smartphone app or automatically sending blood pressure readings to our doctors. But the Internet of Things is destined to become so much more. By integrating the physical world and computer-based systems more directly, it will improve the efficiency, accuracy, and economic value of everything it connects. GE has predicted that IoT will transform industries we *all* depend on with benefits such as "better health outcomes at lower cost, substantial savings in fuel and energy, and better performing and longer-lived physical assets." IoT's effect on our lives will be as transformative as the Industrial Revolution was in the 18th and 19th centuries and the Internet Revolution has been in the 20th century to today.

The Freeway Is Widening, But There Are Speed Bumps

There's little doubt that the Internet of Things will provide numerous benefits and transform the way we interact with our world. But one question remains: Are we equipped as a country to build and run it? While the United States currently leads the world in innovating for IoT, we run the risk of falling behind because we're unprepared to meet rising demand for the specialized talent it requires. The tech industry is evolving and creating new jobs at a pace that the next generation of workers may not be able to keep up with, in terms of their sheer numbers or specific skills. It's been estimated that over 1 million computing jobs will become available by 2020, yet even in this growing economy there's unlikely to be enough qualified graduates to fill them.

Part of the problem is that we lack enough students interested in pursuing the science, technology, engineering, or math (collectively known as STEM) degrees that are essential to advancing IoT and keeping the U.S. competitive in its development. In China, over 1 million college graduates a year receive degrees in STEM fields compared to *half* that number in the U.S. And the demand for these degrees is only going to increase—in a world where all things are digitally connected, everyone needs a solid foundation in science, technology, engineering, and math from an early age. Unless we come up with a strategy for cultivating talent and building a steady pipeline of STEM-educated students, we risk losing our position as a global leader in developing technologies of the future. And that means losing our competitive edge in innovating for the Internet of Things.

Keys to the Fast Lane: Technology, Data, Security

To be sure, the urgency around STEM is nothing new. There's been a steady drumbeat of editorial about the looming talent deficit and its consequences. But the imminent reality of an interconnected world raises the stakes on the demand for traditional STEM talent, as well as the need for developing new talent that includes cross-cutting roles such as engineering and data scientists, and software developers and cyber security specialists. This is because IoT isn't just about technology; it's also about the data it generates. Developing the Internet of Things requires being able to analyze large, complex sets of data and using the insights derived from them to make more informed decisions to improve efficiency and increase value. According to the analyst firm IDC, major services companies have grown their big data and analytics headcounts by an average of 45 percent in each of the past two years. And by 2018, the firm anticipates that there will about 181,000 roles in the U.S. with deep analytics as the primary function.

Another reason that IoT increases the need for STEM talent is *security*. If decisions about our manufacturing, agriculture, or healthcare infrastructures are to be made based on insights gleaned from big data, then there are risks of it falling into the wrong hands. Controlling that risk requires expertise in securing data—a stark reality we read about in headlines every day. There's perhaps no better example of how urgently this confluence of talent is needed than in Fiat Chrysler's vehicle recall last month after researchers successfully hacked into an Internet-connected vehicle to control its engine, brakes, and steering. The Internet of Things is quickly teaching us that it's no longer enough to be innovative; we must also design technology with security in mind.

Raising the Speed Limit and Clearing the Hurdles

The drive to create a deeper STEM talent pool isn't just about maintaining our competitive edge as a global leader in the Internet of Things—it's also about empowerment. Young people are already living their lives digitally, and the earlier we get them interested in STEM subjects, the more influence they can have in developing the interconnected world of tomorrow. Whether parents or mentors, we can all play a role to engage kids in conversations about the opportunities available in STEM disciplines, and our responsibility to create a safe digital environment. At the same time, educators play a vital role to spark interest in STEM subjects at an age when students are most impressionable, and then continue to encourage that interest throughout high school and college. By the time students enter the work force, they'll have been immersed in an IoT environment and more qualified and empowered to innovate for it.

This raises another benefit of more STEM education—inclusion. Greater inclusion of women and underrepresented minorities in the STEM fields helps us ensure that the creators of future technologies mirror the population that uses that technology. Right now, the demographics of the American tech industry don't reflect those of the general population. By encouraging broader representation in STEM fields—across lines of gender, ethnicity, and socio-economic status—we can create a more inclusive tech industry. This kind of diversity has been shown to improve decision-making, solve problems more efficiently, and build better products. The result will undoubtedly be the development of a more innovative and inclusive Internet of Things.

The Role of Private Industry

While the effort to foster the talent to develop IoT starts with role models and educators, it certainly doesn't end there. Leaders in the private sector have a lot at stake too. By supporting programs to educate and train students in STEM-related disciplines, corporations are investing in their future workforce. What's more, that direct involvement, from tech companies in particular, bridges the gap between theory and practice, validating educational efforts with current and real-world relevance.

As a leading provider of information services, my company—which is poised to play a pivotal role in the Internet of Things—believes that inspiring students to pursue careers in these fields is crucial for the U.S. to continue innovating for IoT. We feel strongly that stimulating that interest is important not only for a healthy economy, but also for the nation's safety and security. As such, we've helped launch a number of initiatives in STEM education, including *My Digital Life*, a digital citizenship program that encourages children to learn about the risk and rewards technology can bring. Over 125,000 students have benefited from the course to date. We also partner with Year Up, a year-long, intensive training program that provides low-income young adults with hands-on skill development and corporate internships. Additionally, Neustar employees are involved in numerous mentoring and education outreach efforts to connect with students and ignite their interest in STEM careers.

Ultimately, cultivating the interest and talent to build the Internet of Things is an effort that calls upon several key stakeholders and we can all play a role: parents and mentors; local, state, and federal governments; educators and counselors; and private corporations. The more we all plan for and invest in STEM education today, the more of an edge we'll secure in the interconnected world of tomorrow.

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