Towards a Critical Debate About Technology and its Impact

Self-driving cars, crypto-currencies, wearable technology, and 3-D printers—the future is starting to feel like it might be here. There is no denying it is an exciting time to be in the field of computer science. The tech boom continues in Silicon Valley. Companies like Oculus Rift and What's App are redefining the ways we play games and communicate with friends and family across the globe, and getting gobbled up by tech giants in the process. At Stanford University, computer science is now the largest

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major. CS has fundamentally changed the way we live our lives. It straddles the new algorithms that will change the world in the future and the app you download on your smartphone today.

Technology has become so pervasive that we don't even stop to think about it or notice the complex processing power we have in our pockets or in the cloud. But this invisibility may be both a feature and a liability. How often do we as computer scientists stop to reflect on the ways computing technology is changing the world around us?

We may not have to do it alone: The

recent tech boom is changing how the world looks at computer science, and increasingly it looks on with a critical eye. The NSA data monitoring scandal has made consumers worry about government intrusion and collaboration with the tech industry. And the leaders of large tech companies have been implicated in colluding to keep engineer wages down. Although many users love AIRBNB and Uber for making their lives easier, these companies have also been viewed as anti-regulatory and union busting. Not to mention the media coverage of drones, Google Glass, and a litany of other issues, has only highlighted

the public's concern over the impact of technology.

Today San Francisco, a beacon of computer science and technology, is becoming a powder keg of tense emotions and a burgeoning anti-tech movement. Income inequality and skyrocketing housing prices are seemingly exacerbated by the tech industry's shift from Silicon Valley to San Francisco. A grass-roots movement, Counterforce, is forming against these large tech companies and using radical techniques to draw attention to housing and other issues. These actions seem to mirror the Occupy movement from three years ago, which tried to highlight the large inequalities and terrible practices perpetuated by the financial industry. How is it that the tech world, and computer science practitioners and researchers, are now at the center of it?

Of course there are an overabundance of views on computer science from the public: positive, negative, and between. As there should be. In fact we wish there were more skepticism and debate inside our field. We need to embrace and accept the fact that technology has both a positive and a negative impact. Our research and innovations can have long-lasting implications at the societal, economic, and environmental levels. How do we as a community deal with this in a responsible way?

Looking at the current wave of excitement around 3-D printing, we can view it as a microcosm for how computing technology can impact the world and how the computer science community plays a role in shaping both the technology and the thinking about its impact. 3-D printing has the potential to change the ways we deliver products, allow us to create custom medical devices and orthopedics, and change consumers into designers. At the same time it can allow for the unregulated production of potentially dangerous weapons, and allow people to easily make more and more plastic junk—just as the “paperless office” did very little but cause more paper printing. Digital fabrication and robotics also have the potential to put millions of people out of work

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in the manufacturing sector.¹

Companies and researchers don't set out with the intention to make devices that are harmful, but it is hard to anticipate how technology will be used and how companies may change. Small, scrappy 3-D printing startups emerged with goals of fostering an open source hardware community as an alternative to the entrenched power of large companies that control the product pipelines and means of production. However, as was the case with Makerbot, we have seen those ideals and visions disappear as these companies grow and are bought up by the very giants they were trying to fight.

Ultimately, we cannot ignore these concerns for the simple fact that it is extremely challenging to predict the future, to know how one small piece of research could change the world. At the recent ACM conference on Computer Human Interaction (CHI), author Margaret Atwood, known for her speculative fiction such as *The Handmaid's Tale*, cautioned the au-

dience about our role in designing the technology we want to see. “You never know until the future,” she warned of the unintended consequences of our technological pursuits. We don't have the luxury of waiting to see.

We need more critical debate about technology and its impact on the world today. It is enough to begin the debate, enough to personally reflect, and enough to share these feelings with the community. To do so we need to have more forums for discussion within our field that are welcoming to critical viewpoints. At the same CHI conference during a talk on soft 3-D printers, an audience member questioned the sustainability of the design and if we really want to be designing tools that make more “junk.” Originally the question was written off as somewhat off topic. Looking back, it should have been embraced more seriously. The top academic CS conferences are the exact places where we should be having this dialogue.

A big roadblock to having this kind of debate is the lack of diversity at these conferences and in CS in general. In CS we are often a very technoliterate and techno-positive group of people, but we need to understand there are different ways to approach computer science and different perspectives from which we should think about our work's impact. By increasing the diversity in CS, we increase the number of perspectives.

In this issue, we look at diversity in computer science—reasons for its absence, first-hand perspectives, and possible solutions. Looking forward, we hope to continue to discuss and draw attention to the importance of diversity in CS at XRDS. But more broadly, we hope XRDS can be a platform to discuss and debate the role of technology in our lives, both for good and for bad, and to provide a critical view from many perspectives.

—Sean Follmer and
Inbal Talgam-Cohen

1 Brynjolfsson, Erik, and Andrew McAfee. *The second machine age: work, progress, and prosperity in a time of brilliant technologies*. W.W. Norton & Company, New York, 2014.