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BEING HUMAN IN THE DIGITAL AGE:  
A MORAL OBLIGATION TO MAKE A BETTER WORLD

*Caltech Commencement Address 2015*

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Today we are gathered to mark the passage from student to graduate life—simultaneously celebrating your achievements while clearing the way for the next stage in all of your endeavors. So I want to begin by recognizing today's graduates—CONGRATULATIONS! This is a big thing and is every bit as special as it feels. I also want to recognize all the people who I suspect have made today possible: friends, family, loved ones, colleagues, peers, faculty and staff. It might take a village to raise a child, but I know it takes nearly as much to graduate! So in case someone in the audience forgets to tell you: THANK YOU and CONGRATULATIONS too! I also want to thank Caltech for inviting me to share this day and to speak at this commencement. It is a rare and daunting pleasure.



A quarter of century ago, I sat in a stuffy tent at Bryn Mawr College on the outskirts of Philadelphia to receive my bachelor's degree. I don't remember anything the commencement speaker said, which I suppose takes some pressure off me here. I do remember it was warm, much like today, and I was exhausted and overwhelmed and giddy, as I suspect many of you must be now. But I was lucky enough to have dear friends and family with me to mark what was, for all intents and purposes, a significant rite of passage in my life. And like many other rites of passage, everyone had an opinion about how I should be feeling and what I should do next. I don't want to add to that chorus, for I know how frustrating that can be. Instead I want to do what anthropologists do best and relate some stories and in so doing, share my hopes and fears for the world you are about to enter and the ways you may decide to navigate it.

### *Moore's Law Shapes the World*

The Class of 2015 has much to celebrate, and you will remember this date, measuring your progress against it for years to come. For me, it is also a significant date but for a very different reason. This year marks the 50th anniversary of Moore's Law. The logic of Silicon Valley, the law that predicts the rate of technological change and thus innovation, was born 50 years ago this April. It is older than me, older than many of you, and imagined in a time that seems so very different from today. There was no web, no internet, and there was

certainly no talk of big data, the internet of things, or wearable technologies. Nor were there things like Facebook, Yik Yak and selfie sticks. There was the integrated circuit and a man named Gordon Moore. He graduated from here with a PhD in Chemistry (and a minor in physics). So this is your history as well as your legacy.

In 1965, a popular trade magazine approached Dr. Moore and asked him to speculate about the future of his industry. Looking back over a decade of rapid transformation, he predicted that integrated circuits, the building blocks of contemporary computing, would enjoy an unprecedented rate of growth. He wrote that the number of transistors on a densely integrated circuit would double every year for the next decade. Basically integrated circuits would continue to get more and more powerful on a knowable rate. It was a bold statement of engineering, and 50 years on, this observation has continued to predict the rate of technological improvement. It is quite remarkable, and in and of itself worthy of celebration!

Yet in some ways it is as much a promise about the state of the future as it is a Law. After all it is not a law describing the natural world, but rather a way we have chosen to configure it. It is, in effect, a promise of a world that will be better with every passing year. It is a promise of room to grow and room to imagine, of continuous innovation. In his original article, Dr Moore also articulated why this innovation was important. For him it wasn't just technology for technology's sake. He wrote, and I want to quote here, "Integrated circuits will lead to such wonders as home computers—or at least terminal connected to a central computer—automatic controls for automobiles and personal portable communication equipment. The electronic watch only needs a display to be feasible today." Again, think about it. How many things do we hear today that we imagine will actually be true in fifty years? Can you say with such assurance what the wonders of 2065 might be? I am fairly certain I cannot.

Dr. Moore didn't stop with simply imagining that world, instead he took a bold step we still recognize today. He and his colleagues Robert Noyce and Andy Grove left the company at which they were working, Fairchild Semiconductor, and started their own company—an original Silicon Valley start-up. They conceived a big idea and founded Intel on it. Silicon Valley grew up out of this idea and out of the computing power it unleashed, so did many other technology centers and many other companies. In fact, we have all grown up in the world of wonders it spawned. Every time you send an email, post a photo, flirt long distance, skype, send a remittance payment, use a hashtag to participate in a debate, back a political candidate and then hate all the emails they send you later, worry at the venom in the comments sections, fund someone's great idea, binge on another season of Game of Thrones or House of Cards, buy something on Amazon, or share that video with the cat in a shark suit on a robotic vacuum cleaner being chased by a duck, you are living in the world that Dr. Moore and all his contemporaries built for us. They gave us 50 years of technological innovation and change.

## *The Life of an Anthropologist*

And for 16 of those last 50 years it has been my privilege to work in the middle of it all, at Intel. It has been my job, my home, my family, my passion and my complicated love. Dr. Moore's path to Silicon Valley was relatively straight forward and one many of you might follow. Mine was more circuitous. I was born and raised in Australia, the daughter of a working class mother who was determined to live a life different to that of her parents. When she started at university, my brother and I were both under the age of 5, and she was a single parent. I grew up then on my mother's field sites in central and northern Australia in the 1970s and 1980s. I was raised in indigenous communities by people who remembered their country before white fellas, and cattle and fences and who would always tell us their stories. It was a childhood of no shoes, speaking another language, operating in a very different cultural system, hunting and gathering, and frequent absences from school. My long division has never recovered from this, but I know how to get water out of frogs, and that's not something you can say about everyone. And it also meant a childhood of the extraordinary opportunity to see the world through the eyes of others. And it shaped me forever. Making sense of what I had seen, of how the original inhabitants of Australia lived, and of what my white forbearers had been complicit in, and still were, was a hard thing to understand as a kid. I was lucky that whilst my mother was an academic, she was also an activist and a firm believer in social justice. She taught me to see beyond first instincts; reminded me that it was okay to ask questions and be critical; and encouraged me to see that authority was earned and not a right.

She raised my brother and me on one very simple principle: if you could see a better world, you were morally obligated to help bring it into existence. That you should put your time, energy, passion, intellect, heart, soul—everything—on the line. She believed that you shouldn't sit on the sidelines but that you should actively advocate for the world you want to see, and that world should be one that was better for many, not just for you. This principle helped me find a path through my childhood and to find ways to try to make a difference. And I have watched my mother live by that compass my whole life. And the notion, that one was morally obligated to make a better world is something that has, in turn, shaped my own intellectual and personal journey.

Still it is a long way from the aboriginal communities of Central Australia to Silicon Valley. I am often asked how I ended up at Intel. As some of you may have read, it started when I met a man in a bar in Palo Alto. I had recently finished my PhD in Cultural Anthropology at Stanford University and was on the faculty, in a tenure line position, happily teaching and working on my first book. The man owned a start-up and had connections throughout the Valley. He claimed to be intrigued by what I did and concerned about my future. I took this to be a fairly standard bar ploy and went home, alone. So imagine my surprise when he called me at home the next day because my mother, like I'm sure some of the mothers in this audience, had cautioned me not to give my number to strange men in bars, and I hadn't. This was in 1998, before LinkedIn and Facebook, and certainly before swipe right on Tinder, before a white box on the internet into which you could have typed up my name. Instead, he'd done it the old fashioned way. He called every anthropology department in the Bay Area looking for me by description. She's redheaded, Australian, loud. To the infinite credit or discredit of the secretary of the Stanford Anthropology Department, she

said, “Oh, you mean Genevieve, would you like her home phone number?” And so here I have Bob on the phone saying, “You seem interesting,” and I’m saying, “But you don’t.” And then he said the magic words that some of you will recognize. He said, “Let me buy you lunch.” When you’re fresh out of school, the prospect of free food is still a motivating factor.

So I had lunch with him. Ultimately he introduced me to the people at Intel, who interviewed me and to my utter surprise made me a job offer. Of course, I didn’t really understand what they were offering so saying “yes” was hard. It was nothing I had imagined for myself and I loved the job I had at Stanford. But still one day I woke up in my bed in Menlo Park and I realized I had a choice. I could choose to stay in the university system and pursue tenure, or I could leap into something unknown. Silicon Valley, though I was sitting in the middle of it at Stanford, seemed like a foreign country but also the center of the largest technological transformation of my lifetime, one that seemed unnaturally pre-occupied by engineering concerns—the tyranny of speeds and feeds. As anthropologists, we like foreign countries and things that don’t yet make sense. As my mother’s daughter, I was compelled by the idea that I could make a difference in this new world. And that maybe, I could help make a better world if I could find a way to bring people into what felt like a very technical conversation about the future. That perhaps with a little help we could design a digital world in which we could still be human, complete with our complexities, contradictions and mess.

So I left Stanford, and I joined Intel. And on my first day, my new boss said, “We’re so pleased you’re here because we need your help with two things.” I took out my notebook and wrote the numbers one and two in it and asked: “What two things are they?” My new boss said, “Well, we need your help with women.” I said, “OK, which women?” My new boss said, “Well, all of them.” “All 3.2 billion,” I asked. And she said, “Yes, that would be excellent.” And I found myself saying, “What is it you imagine I will do with 3.2 billion women?” And my new boss smiled and replied, “It would be great if you could tell us what they want.” So in my notebook I wrote down, women all and underlined it several times, trying to imagine the project you would do to answer this question—it felt like a big question.

But then I realized she said there were two things. And if number one comprised of all women, it was horrifying to contemplate what number two might be. I think I secretly hoped the answer would be men. Because then I’d know what was in scope was the whole of humanity. But no, my new boss said, “Listen Genevieve, we have this ROW problem and we could use your help.” And I had to confess that I didn’t know what ROW stood for, and my new boss explained it meant “rest of world.” Rest of world! And so I said, “Where is the Rest of World” and she said, “That’s everything outside of America.” Well okay, I thought.

So my new job seemed to involve women and everyone who didn’t live in America. I went back to my desk. I will confess at this point, I was in a kind of mixed state of fear, terror and a vague nagging sense that I might have made a bad decision. Because the notion that I might, like some modern day oracle, hold the key to understanding women and the rest of the world seemed overwhelming; it was an awesomely

frightening task. But it was also exactly what I wanted, the opportunity to put people into the story, and perhaps shape how a foundational technology company saw the world. It was about putting people back into the process by which technology is made. And that has been the job—using the insights gleaned from spending time in people’s homes and in their lives to help shape the next generation of technology production and innovation.

Why am I telling you all of this? The lesson here is surely not hang out in bars and say “yes” to strange men; nor is it that your next degree should be in anthropology. Rather it is that there is never just one way forward, and that there will always be choices to be made. And in some of those choices are also opportunities to do more than just follow your passions or your dreams, opportunities to craft and shape a better world. It will require work, you will need to know what you believe in, and why. It might take time and critical self-reflection—luxuries in a hyper-connected life. For me, it has been a long hard slog, but my very best days, I have a job in which I think I can help make a better world for all of us.

### *Charting Your Own Course*

So how will all of you chart a path through this world? How will you make the world a better place? What will you bring with you from Caltech and from your lives?

It is cheeky to suggest that somewhere between my life and Dr. Moore’s is a path you could pick. But between the anthropologist and the chemist, between the champion for people and the architect of technology, there is the world we inhabit and the outlines of the world you will help continue to build. You will always be the combination of your technical skills and your humanity, and that is a heady mix. It is tempting sometimes to imagine that the answer is technology alone, but I think it must be balanced by our sense of the world and the things we hope it might be, and the things it already is.

In my nearly 16 years at Intel, there are some things that seem so very clear. There are indeed rapid cycles of innovation and ongoing technological transformations and they offer promise as well as problems. Our concerns and anxieties echo through the ages. We worry about our reputations, our privacy, our safety, our kids, our families, our communities and even our cultures. We worry about our governments, our industries, the environment, the state of the planet and our futures. We worry that the technology will take over (robot apocalypse anyone), or that we will become irrelevant, or both. So much to do, so many things to solve or redress—and so many opportunities for impact and change.

Yet the things we care about as human beings are indelible, important and also form the basis for new ideas and innovations. We will always be social creatures; we need friends and family, though the definitions of such are clearly and powerfully changing. We want to participate in communities of practice and preoccupation—we need people who share our hobbies, our foolishnesses, and our delights. We want to belong to something bigger than ourselves. We crave meaning, substance and purpose. And perhaps we need to be something more than an n of 1.



I am frequently told that millennials have a strong sense of purpose, and I sincerely hope that is true. In a world where it sometimes feels like everything is about immediate gratification and a kind of insular self-orientation, you could also chose to embrace the idea of the moral obligation, of the necessity to commit to making a better world. Certainly, paid work is a good thing and being gainfully employed will not just make your parents happy but bring you gratification too. However, there is room for more. The work we chose, the lives we live, the ways we chose to inhabit our homes, and participate in our communities, cultures and countries can mean something and matter! And I firmly believe you cannot sit on the sidelines of this life.

Instead, I like to believe we will all contribute in small or large ways. We can all find ways to make a better world. And as you are some of the finest scientific minds of your generation there is a lot of work for you to do!

Sometimes the work we can do to shape the world is more than technical though, more than engineering, more than the strictly scientific. It is about principles and values. After his time at Intel, Dr. Moore and his wife, Betty, started a Foundation that gives generously to causes from healthcare to environment stewardship. The current CEO of Intel, my boss, Brian Krzanich, has pushed Intel to ensure our supply chain sources only conflict-free minerals and he is personally and publically advocating for diversity and inclusion in the technology industry and its education pipeline. Apple CEO Tim Cook has been public about his concerns around data privacy and gay rights. He has used Apple's significant reach to push for the changes in which he so clearly believes. Del Harvey at Twitter advocates for citizen and consumer trust and security. She firmly embodies the notion of a better world in which we might live. And Megan Smith left a job in the Valley to join the federal government to change the conversation on technology at a policy and regulatory level. They are all leaders in the technology field who believe in better worlds and are willingly putting themselves out there to make it happen.

Of course, for every public face, there are private acts too, every day acts of deciding the other ways the world could unfold: my male colleagues who will not participate in panels where there are no women; my peers who volunteer their time in after school science programs to ensure equity of access to underprivileged kids; my academic co-conspirators who are reclaiming the histories of women technologists we may have forgotten; my former students who are building apps to help more transparent policing practices; my friends who takes time out from work to stack the library shelves in Ferguson, Missouri, or volunteer for the ongoing recovery effort in Haiti; the alumnae from my college who are sitting in this audience and who have been, I am sure, the only women in their classes and who have not just survived but excelled. Perhaps your acts of moral obligations for a better world will be like this ... small, persistent, powerful, wonderful.

## *A Final Thought*

I am mindfully aware, however, that none of these will come without struggle. It is hard to commit to a better world, to commit to something bigger than yourself, and to keep pushing for it in the face of criticism and opposition. Moral obligations come, I fear, with acute struggles. I said earlier that Intel was a complicated love for me, and it is. It is hard to be an anthropologist in a company of engineers; hard to be a woman in an industry still dominated by men; and hard to be so focused on people, when the conversation is about bits and bytes, and regimes of value follow. Indeed, sometimes I wonder why I am still there and fighting to stay in that conversation. On those days, I buy shoes, eat chocolate, binge on bad television and remind myself that it is all bigger than me. That the world we are collectively building in Silicon Valley and beyond—a world of things digital and human—is a world that needs as many different voices as we can find. Which is to say, if you chose to live for something larger than yourself, you have to remember that this is precisely what you are doing!

You are graduating from one of the very best schools in the United States, with a proud record of scientific and technical endeavor. And you are entering a complicated and complex world which is always the best moment, because it is rich with possibility and peril, and lush with prospects. As scientists, engineers, technologists, you have a unique set of skills to make a difference. Fifty years ago, a graduate of this institute imagined a better world and spent his life ensuring it would exist. He had an idea that still shapes the world we live in today.

What will be your idea? And how will you ensure that what you bring to the table isn't just your technical expertise, and the skills you learnt here, but also your humanity and your obligation to make this world a better place? For the Class of 2015 your work starts now—for new, exciting technologies and also for humanity. I believe you have an obligation by dint of graduating from here—from this place in this time, from this remarkable university. You must work for what's bigger than you, more than you, outside of you. If you remember nothing else today, I hope it is this: you can make a better world. Ask yourself: What will you do today, tomorrow, 50 years from now. What will you do?

Thank you!