The Future is Here

Today's Most Promising Technology

By

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Many years ago, while I was still living in Louisville, I was among a group of community leaders invited to meet with a delegation of leaders from Afghanistan, which included government official, educators, imams, and other tribal leaders. Ours was the very first group of Americans many of them had ever met or spoken to, and some were *not* pleased to do so. They were angry with us because the US "War on Terror" had devastated their country, as well as their Iraqi neighbors for no good reason, and killed thousands among their friends, families, and countrymen. When it was my turn to speak, I shared my heartfelt apology, explained that not all Americans agreed with the war, and that many of us protested it before and after it began. By lunch, despite the language barrier, we had become friends. That's when one of them said, "Before today, we thought all Americans had been around their machines for so long that they had become machines. But now we know you are not machines; that you are real humans with human hearts."

I was astonished that their feelings about us had been transformed so completely in such a short time, that their anger had dissipated, and they were able to acknowledge our common humanity. But I bring this anecdote up today because their attitude about technology is a common one, this sense that there is something inhuman about it and those who use it. Whenever I bring up my love of technology and the optimism it instills in me, I'm met with a degree of resistance and, sometimes, hostility. My only response is that the proof is in the proverbial pudding. So today I want to share how technology is being used right now to solve some of the world's greatest challenges. Technologies are doing so because that is the goal of their creators, "real humans with human hearts."

The following examples are from various presentations at this year's Abundance 360 Conference, which occurred in March. I didn't attend in person, but, as a technology geek, I watched it on my VR headset in my virtual mountain retreat, and sometimes in my outer space apartment, on a high-definition screen as large or small as I wanted to make it. I'm especially enthusiastic about virtual and augmented reality because it is now allowing us to digitize and use other tech, so we'll no longer have to use physical resources to manufacture them. I'll never buy another television set in my life, for example, nor a lot of other things that are becoming digitized. I can even watch movies in a virtual big screen theatre or drive-in from the comfort of my own recliner. VR and AR also mean we don't have to burn fossil fuels to experience things that are distant from us. A few weeks ago, Peggy and I played a round of put-put golf in a beautiful virtual rendition in Venice, and another in the Scottish highlands. That's good news for the environment and a better use of our limited time.

This past year, Apple got into the game with its Vision Pro headset, allowing users to engage in spatial computing without disengaging from the real world. And Meta has likewise turned its headset into both a VR and AR device, allowing users to work on their computers with virtual screens and keyboards from their home, office, or any environment they want.

I LOVE VR and AR, which combined are called Extended Reality, but rather than droning on about it, let's talk about actual drones. During his presentation on "The Future of Mobility," Cyrus Sigari, Managing Partner with UP.Partners, a company that builds and invests in technologies that help move people and goods cleaner, faster, safer, and cheaper, said "Outside of the war in Ukraine, the single largest driver of drone technology is a little company in Bentonville, Arkansas called Walmart. Just a couple of months ago they announced that 1.8 million households in the Dallas-Fort-Worth area will start to get drone deliveries." If the idea of having drones in the sky seems obtrusive, consider all the two-ton cars on the road going back and forth to do the same. As Sigari put it, "You order a box of pasta from Walmart delivered to your home, the amount of energy consumed to boil the water is more than the energy used to deliver it to your house." Imagine the energy we'll conserve and the time we'll save when we don't have to go shopping for everything we want or need.

But if you do need to go somewhere, rather than hitting the road and potentially getting stuck in traffic, how about flying there in a drone like aircraft instead? Cofounder and CEO of Archer Aviation, Adam Goldstien reminded conference attendees that in many places going just a few miles to work can take ninety minutes or more. Flying that distance would only take five to ten minutes. There have been a few helicopters that have tried to take advantage of this reality, but they are so noisy that most cities have banned them, with a few exceptions like New York City. But they are also cost prohibitive for most, have a poor safety record, and are harmful to the environment.

Archer Aviation, however, has developed Evtol, a zero emission, 100X quieter than a helicopter, fully redundant (for safety), electric vertical takeoff and landing vehicle named Midnight. It's designed for a pilot and four passengers and can travel at 150 MPH with a 100-mile range. Archer will begin at prices comparable to what it now costs to ride an Uber but plans to scale rapidly and bring costs down dramatically, ultimately below the price of car ownership.

Now, if only they could sell the idea … wait a minute … they already have. Archer is happening and plans to be in the air in 2025. United Airlines has put a 1.5-billion-dollar deposit on vehicles. Stellantis, the 3rd largest auto manufacturer in the world, is building a plant that will initially produce 650 of these "flying cars" per year. The FAA has already approved them, and the US government is a large supporter, as is NASA. Midnight is a global product that has already been pre-sold to buyers around the world. As Goldstein says, "It's much further ahead than I think people understand, and it's going to change the world much faster than I think people could ever imagine."

Amazing as this is, Eric Schmidt, the former CEO of Google, believes drones will soon make war pointless. He says, "the ubiquity of drones means, in my view, that tanks, and artillery,

and more go away as weapons of war. I'm a sufficient optimist that I believe once countries figure out a way to make this ubiquitous notion of drones for their own defense, it will become impossible to invade an adjacent country, because once the tanks begin to roll you can just bomb them with drones, and the drone costs $5000 or less and the tanks cost $5-million or less." Because of their affordability, drones can equal the playing field between poor nations and superpowers.

Schmidt admits that current drones aren't this sophisticated yet but adds that in another year "a-symmetric innovation can allow a smaller government [like Ukraine], which is a new democracy trying hard, to counter the moves of a large and established invading power." Schmidt, who is an advisor to governments on national security, admits this means "it's going to be harder for the US to invade neighboring countries" too, but having himself witnessed the horrific frontlines in Ukraine, he says "we want to do everything we can to stop war and I think there's a scenario where AI makes it much less likely. There'll certainly, with AI empowered weapons, be far less collateral damage … The biggest casualties of war are not actually the soldiers but the civilians. So war is horrific and if you have to do it … don't kill women and children and old ladies and bomb the buildings like the Russians have been doing with their tanks … Those are called 'war crimes.'"

Schmidt is a real human with a human heart and I he's right, that the affordability and ubiquitous use of intelligent drones will soon make going to war pointless. We should not be bombing buildings, we should be building them, which is precisely what ICON, and Austin, Texas based Robotic Construction company is doing right now in a way that is set to fundamentally transform homebuilding for good. Jason Ballard, its founder, and CEO began his presentation by stating the average cost of a US home is currently $650 thousand. That's a lot by any standard, but especially so given that the US Census Bureau reports the median household income is just under $75,000.[1]

Ballard went on to point out the most expensive part of a new home is its wall system, amounting to about $115 thousand. These systems, made of framing, sheathing, moisture barriers, siding, trim, and drywall, cost $35 per square foot, which, he says, have the lowest energy rating (R-13) allowed, have no wind load or fire ratings, and are easily damaged by water and termites. "If I offered a million-dollar prize for someone to invent a lower quality material than drywall that would pass building code, nobody would win the prize. It is literally the crappiest material we can think of to build with."

ICON, by contrast, is 3D printing walls rated R-22 (50% above code), has a 200 MPH wind rating, a two-hour fire rating, and termite protected, mold resistant, and flood resistant. In 2018, its first walls cost a whopping $315 per square foot. But since then, after several iterations, its wall systems, as of this year, are now $34 per square foot, a dollar less than the crappiest walls. And the material they are now printing with, called Carbon X, is the

most sustainable building material to build with, according to MIT's Concrete Sustainability Hub. And it can be used to print the foundation and roof at the same low cost.

So far, its astonishingly beautiful and individually unique homes have been printed with a state-of-the-art industrial size printer—one, two, and three houses at a time. But ICON just designed a one arm printer, powered by AI, that can print a 2,400 square foot, two story house, in a single print, which accounts for more 90 percent of the buildings on Earth. This new printer, called Phoenix, can be set up in three hours and multiple systems can be run by a single operator. Imagine a dozen of these systems autonomously printing an entire neighborhood in almost no time, each with its own unique design at no extra cost. ICON even has a generative AI program you can use to describe the kind house you want and have it render a drawing, along with a detailed design, and the construction documents you'll need to make it real. And, with this system, the wall construction, along with the foundation and roof, are now down to $25 per square foot.

ICON's goal is to provide beautiful, affordable housing so that nobody on the planet has to live in squalor or on the streets. Ballard concluded his presentation with these inspiring words, "When you can go from human desire, and that human desire can then be manifested—I don't mean woo woo manifested—I mean made real in the world with robots, that is a formula for having homes that are twice as good, at half the price, and in half the time. That's how we make housing with dignity abundant in this world, and I don't know about you, but relative to the way that we've been building, it feels more human, not less human. It feels like we can shape this world to fit our desires, to uphold our highest ideals and our deepest values. And I think AI systems, the power of robotic systems are the way that we get it, and what I'm here to tell you today is that that world is not in the future. We are taking orders on that world today." Ballard is a real human with a human heart.

Once you're in your sustainably constructed, uniquely magnificent home, you'll also want to enjoy sustainable meals. How about a delicious plate of chicken teriyaki made with cultivated meat that didn't require the death or suffering of another creature, nor the destruction of the environment to grow the feed a live chicken needs? Josh Tetrick, cofounder and CEO of Eat Just, began his presentation by reminding us that a third of our planet is used for just growing the corn and soy we use to feed the animals we eat, including 70-billion chickens. And with global affluence on the rise, along with a growing demand for meat, we'll soon need two-thirds of the planet to grow enough grain to feed all those unfortunate creatures.

Fortunately, Eat Just, which currently produces Just Eggs, the egg alternative you'll find in most grocery stores these days, has been cultivating chicken meat, which starts with a single chicken cell that's fed amino acids in a stainless-steel vessel. It is real meat that's grown without harming an animal or cutting down a single tree for cropland. The process currently produces only small amounts, which makes it prohibitively expensive, but it has

already been approved for sale by the FDA and Eat Just is now working on plans to scale up production, which will bring down its price.

Like 3D printed houses, cultivated meat is real, right now. It's here, and if you don't believe me, just ask Governor Ron DeSantis, who just signed a law banning the production and sale of cultivated meat in Florida. As he said during a press conference, "You need meat, okay. And we're going to have meat in Florida. We're not going to have fake meat! Like, that doesn't work … Take your lab grown meat elsewhere." Bad decision for Florida on his part, but it shows this budding industry is being taken seriously.

Eat Just is a serious business and is poised to make a serious change in the way we produce and consume meat, with meat that's healthier, more flavorful, has less cholesterol, less saturated fat, higher protein, is richer in amino acids, cheaper, and better for the environment. "Before I die," Tetrick says, "I want to live in a world where the vast majority of meat that's consumed doesn't require the slaughter of a single animal, doesn't require the tearing down of a single tree, doesn't require one drop of antibiotics. That's the world that I want to live in." He also plans to have the cultivated meat sold by a major retailer in three to five years, then into the mainstream. He's a real human with a human heart.

We all know the ability of stem cells to become any kind of cell there is, and how some are using them to 3D print new organs. But researchers at the Allen Discovery Center at Tufts University are working on regrowing limbs and organs using bioelectrical signals to create a cellular compiler that stimulates the synapsis of the cells inside our bodies, noninvasively instructing them to do things on their own that they are already capable of doing, like repairing a damaged heart, correcting a birth defect, curing cancer, growing a new limb, or reversing aging. The code for doing so is already there and always has been, but we can now figure it out with the help of AI. This technology is here and is expected to be a commonplace treatment for all manner of illness and injury before the end of this decade.

When I first began giving an annual sermon about the best technology of the year in 2021, I called it the "year of artificial intelligence." But, with the recent introduction of GPTs, I'd have to say this is the year of artificial intelligence. Although this is likely going to be the story every year from now on. AI is already changing everything by allowing us to process huge amounts of data in seconds, which means we can develop new medicines and make gains in material science that will be better for the environment. The possibilities are endless and coming fast.

But there's another kind of super intelligence now being born that is far more mind-blowing than AI. I'm talking about quantum computing. To make this happen, Google is developing a computer chip that will hold a million qubits. It's been moving toward this goal in six stages, the first two of which have already been achieved. Its first milestone, reached in 2019, was a single chip that could complete in minutes a computation that

would take the best supercomputer then about 10 thousand years. When it achieves its final milestone, near the end of this decade, it will take today's best supercomputer a billion years to do what Google's quantum chip can do in minutes. Google's goal is to build "The first large, error-corrected quantum computer and make its benefits universally accessible and useful." Some of its benefits include quantum simulation, which essentially means it can conduct experiments through computer generated simulations in seconds, instead of real-world materials and subjects over a period of years and decades, helping us to develop more effective means of carbon removal, better batteries, safe nuclear fusion reactors, new medicines, and so forth. At that point, just a few years away, the world is likely to change so quickly that the most appropriate word to describe it is *transcendence*.

But the most mind-blowing point about quantum computing is how it works, or, at least, how it's believed to work. Hartmut Neven, VP of Engineering for Google Quantum AI, confirms what theorists have said about this potential technology for decades. "It's the first technology that takes the idea serious that we live in a multiverse, and you can think about its accelerations come from farming out its computations to multiple parallel universes … You have license to think that." So think about that, computing at a quantum level allows AI to do so by accessing information from other universes, perhaps as vast and seemingly as endless as the stars in our own. It sounds like science fiction but it's real, real enough that XPrize has launched a new $5-million competition to develop quantum computing technology that can develop real-world benefits tied to the United Nations Sustainable Development goals. This is another ambition driven by real humans with human hearts.

There is so much more technology for good I can talk about, but don't have time for. But the point I want to leave you with is that all these technologies, and lots of others, are being developed by people who aren't seeking to become wealthy or to exploit others or the Earth, but to build a better and healthier world for all of us—real humans with human hearts. Using extended reality to eliminate travel and save material resources. Using energy efficient drones to deliver goods, travel distances, and end war! Printing sustainable, beautiful, elegant, affordable homes for everyone on the planet. Cultivating meat that's healthy for us and doesn't require the suffering of other beings. Advancing noninvasive and miraculous medical treatments that can heal almost anything.

As a concerned environmentalist, I have studied under and read the works of many writers trying to convince all of us about the dangers of Global Warming, about the beauty of the natural world, about our profound connection to nature, but, other than making people more aware, which is important, they've been powerless to impact real change. At best, in making some of us more conscious, we then turned to technology to actually lessen our carbon footprint—buying EV and Hybrid electric cars, putting solar panels on our homes, recycling our trash, and, hardest of all in today's world, conserving what we can. I'm glad to know the world is full of people like me, who appreciate technology enough to want to use it to make things better quickly, real humans with human hearts.

[1] https://www.census.gov/library/publications/2023/demo/p60-279.html