Futureproof

9 Rules for Humans in the Age of Automation

Kevin Roose

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Proceed as way opens.

—Quaker proverb

Introduction

Recently, I was at a party in San Francisco when a man approached me and introduced himself as the founder of a small AI start-up.

As soon as the founder figured out that I was a technology writer for *The New York Times,* he launched into a pitch for his company, which he said was trying to revolutionize the manufacturing sector using a new AI technique called "deep reinforcement learning."

Modern factories, he explained, were struggling with what is called "production planning"—the complex art of calculating which machines should be making which things on which days. Today, he said, most factories employ humans to look at thick piles of data and customer orders to figure out whether the plastic-molding machines should be making X-Men figurines on Tuesdays and TV remotes on Thursdays, or vice versa. It's one of those dull-but-essential tasks without which modern capitalism would probably grind to a halt, and companies spend billions of dollars a year trying to get it right.

The founder explained that his company's AI could run millions of virtual simulations for any given factory, eventually arriving at the exact sequence of processes that would allow it to produce goods most efficiently. This AI, he said, would allow factories to replace entire teams of human production planners, along with most of the outdated software those people relied on.

"We call it the Boomer Remover," he said.

"The…Boomer…Remover?" I asked.

"Yeah," he said. "I mean, that's not the official name. But our clients have way too many old, overpaid middle-managers who aren't really necessary anymore. Our platform lets them replace those people."

The founder, who appeared to be a few drinks deep, then told a story about a client who had been looking for a way to get rid of one particular

production planner for years, but could never figure out how to fully automate his job away. But mere days after installing his company's software, the client had been able to eliminate the planner's position with no loss of efficiency.

Slightly stunned, I asked the founder if he knew what had happened to the production planner. Was he reassigned within the company? Was he just laid off unceremoniously? Did he know that his bosses had been scheming to replace him with a robot?

The founder chuckled.

"That's not my problem," he said, and headed to the bar for another drink.

—

I've loved technology since I was a kid, when I spent all my free time building websites and saving up allowance money for new PC parts. And for years, I rolled my eyes whenever someone suggested that computers would destroy jobs, destabilize society, or usher us into a futuristic dystopia. I was especially dismissive of people who predicted that AI would one day make humans obsolete. Weren't these the same panicky technophobes who warned us that Nintendo games would melt our brains? Didn't their fears always end up being overblown?

Several years ago, when I started as a tech columnist for the *Times,* most of what I heard about AI mirrored my own optimistic views. I met with start-up founders and engineers in Silicon Valley who showed me how new advances in fields like deep learning were helping them build all kinds of world-improving tools: algorithms that could increase farmers' crop yields, software that would help hospitals run more efficiently, self-driving cars that could shuttle us around while we took naps and watched Netflix.

This was the euphoric peak of the AI hype cycle, a time when all of the American tech giants—Google, Facebook, Apple, Amazon, Microsoft—were pouring billions of dollars into developing new AI products and shoving machine learning algorithms into as many of their apps as possible. They wrote blank checks to their AI research teams, and poached professors and grad students out of top computer science departments with frankly hilarious job offers. (One professor told me, in hushed tones, that a tech company had just offered one of his colleagues a $1 million annual contract that only required him to work on Fridays.) Everywhere you

looked, start-ups were raising gargantuan funding rounds, promising to use AI to revolutionize everything from podcasting to pizza delivery. And the conventional wisdom, at least among my sources, was that these new, AI-based tools would be an unequivocally good thing for society.

But in the past few years, as I've spent more time reporting on AI and automation,* three things have made me rethink my optimism.

First, as I studied the history of technological change, I realized that some of the stories technologists liked to tell—like the narrative that technology had always created more jobs than it destroyed, or that humans and AI would collaborate rather than compete with one another—turned out to be, if not false, then at least radically incomplete. (We'll take a closer look at some of these narratives, and the holes they contain, in Chapter 1.)

Second, as I reported on the effects AI and automation were having in the world, I saw a stark gap between the promises these technologies' creators had made and the actual, real-world experiences of the people using them.

I interviewed users of social media platforms like YouTube and Facebook, who had thought that those platforms' AI-driven recommendation systems would help them find interesting and relevant content, but who had instead been led down rabbit holes filled with misinformation and conspiracy theories. I heard about teachers whose schools had implemented high-tech "personalized learning" systems in hopes of improving student outcomes, but who had found themselves fumbling with broken tablet computers and erratic software. I listened to the complaints of Uber and Lyft drivers who had been lured by the promise of flexible employment, but then found themselves suffering under the thumb of a draconian algorithm that nudged them to work longer hours, punished them for taking breaks, and constantly manipulated their pay.

All of these stories seemed to indicate that AI and automation were working well for some people—namely, the executives and investors who built and profited from the technology—but that they weren't making life better for everyone.

The third, and clearest, sign that something was off came in 2019, when I started hearing snippets of a more honest automation conversation.

This conversation wasn't the rosy, optimistic one playing out on tech conference stages and in glossy business magazine spreads. It was happening privately among elites and engineers, like the start-up founder

who told me about his Boomer Remover software. These people had seen the future of AI and automation up close, and they had no illusions about where these technologies were headed. They knew that machines are, or soon will be, capable of replacing humans in a wide range of jobs and activities. Some of them were greedily racing toward fully automating their workforces, their eyes bulging with dollar signs like Looney Tunes characters. Others were more worried about the political backlash mass automation could cause, and wanted to engineer a softer landing for the victims. But they all knew that there *would* be victims. None of them were under the impression that AI and automation will be good for everyone, and nobody was even considering pumping the brakes.

I got my first glimpse of this other automation conversation during the World Economic Forum, an annual conference held in Davos, Switzerland. Davos bills itself as a high-minded confab where global elites gather to discuss the world's most pressing problems, but in reality it's more like the Coachella of capitalism—a beyond-satire boondoggle where plutocrats, politicians, and do-gooder celebrities come to see and be seen. It's the only place in the world where it wouldn't be at all unusual for the CEO of Goldman Sachs, the Japanese prime minister, and will.i.am to sit around chatting about income inequality while eating $37 sandwiches.

My bosses at the *Times* had invited me to cover that year's forum, which was focused on "Globalization 4.0"—the essentially meaningless term Davos types had concocted for the emerging economic era defined by this new, transformative wave of AI and automation technology. Every day, I went to panels with titles like "Shaping a New Market Architecture" and "The Factory of the Future," where powerful executives vowed to build "human-centered AI" that would be great for companies and workers alike.

But at night, after their public events were over, the Davos attendees took off their humanitarian masks and got down to business. At lavish, off-the-record dinners and cocktail parties, I watched them grill tech experts about how AI could help transform their companies into sleek, automated profit machines. They gossiped about which automation products their competitors were using. They struck deals with consultants for "digital transformation" projects, which they hoped would save them millions of dollars by shrinking their reliance on human workers.

I ran into one of those consultants one day. His name is Mohit Joshi, and he's the president of a company called Infosys, an India-based consulting firm that helps big businesses automate their operations. When I

asked Joshi how his meetings with executives were going, his eyebrows arched, and he told me that the Davos elite's obsession with automation was even more intense than he—a guy who *literally automates jobs for a living*—had expected.

Once, he said, his clients had wanted to reduce their workforces incrementally, keeping maybe 95 percent of their human workers while automating around the edges.

"But now," he told me, "they're saying, 'Why can't we do it with *one percent* of the people we have?' "

In other words, when the cameras and microphones were off, these executives weren't talking about helping workers. They were fantasizing about getting rid of them completely.

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After coming home from Davos, I decided to learn as much about AI and automation as I could. I wanted to know: What was actually happening inside companies and engineering departments? What kinds of people were in danger of being replaced by machines? What, if anything, could we do to protect ourselves?

So, for months, I interviewed engineers, executives, investors, politicians, economists, and historians. I visited research labs and start-ups, and went to tech conferences and industry meet-ups. I read approximately a hundred books whose cover art consists of a robot shaking hands with a human.

As I was reporting, the public conversation around automation began to shed some of its optimistic sheen. People started noticing the destructive effects of social media algorithms, which entrapped users in ideological echo chambers and nudged them toward more extreme beliefs. Tech leaders like Bill Gates and Elon Musk warned that AI could put millions of people out of work and urged politicians to take it seriously as a threat. Economists began making gloomy predictions about what AI would do to workers, and politicians began stumping about the need for radical solutions to fend off an automation-fueled unemployment crisis. The most prominent public figure to sound the alarm, the New York businessman Andrew Yang, ran for the Democratic nomination for president in 2020 on a promise to give all Americans a $1,000-a-month "freedom dividend" to cushion the blow of automation. He didn't win, but his warning of a

looming AI revolution entered the zeitgeist and pushed the conversation about technological unemployment into the mainstream.

Fears of job-killing machines aren't new. In fact, they date back to roughly 350 B.C.E., when Aristotle mused that automated weavers and self-playing harps could reduce the demand for slave labor. Since then, machine-related anxieties have ebbed and flowed, often peaking during periods of rapid technological change. In 1928, *The New York Times* ran an article titled "March of the Machine Makes Idle Hands," which featured experts predicting that a new invention—factory machinery that ran on electricity—would soon make manual labor obsolete. After World War II, as more factories began to install manufacturing robots, it again became conventional wisdom that workers were doomed. Marvin Minsky, the MIT researcher typically credited as the father of artificial intelligence, was reported to have said in 1970 that "in from three to eight years we will have a machine with the general intelligence of an average human being."

These fears never materialized. But today, AI anxiety is burning bright again, fueled by popular books like Martin Ford's *Rise of the Robots* and Erik Brynjolfsson and Andrew McAfee's *The Second Machine Age,* both of which made the case that AI was going to fundamentally change society and transform the global economy. Academic studies of the future of work, like an Oxford University study that estimated that as many as 47 percent of U.S. jobs were at "high risk" of automation within the next two decades, added to the sense of impending doom. By 2017, three in four American adults believed that AI and automation would destroy more jobs than they would create, and a majority expected technology to widen the gap between the rich and poor.

I spent much of 2019 reporting on these changing attitudes, being careful to keep an open mind to the possibility that these fears were exaggerated. After all, unemployment in the United States was still near a record low, and while corporate executives were chattering among themselves about AI and automation, there wasn't much obvious evidence that it was taking a toll on workers yet.

Then Covid-19 arrived. In the spring of 2020, much of the United States entered shelter-in-place lockdowns, and my phone began lighting up with calls from tech companies telling me how the pandemic was affecting their plans for automation. The difference, now, was that companies *wanted* to publicize their efforts to automate jobs. Robots don't get sick, after all, and companies that could successfully replace humans with

machines could continue making goods and providing services even while the virus was raging. Consumers were excited about automation, too, because it reduced the need for human contact.

The pandemic gave companies the cover they needed to make huge, unprecedented strides in automation without risking a backlash. So they automated, and automated, and automated some more. Tyson Foods, the meat producer, brought in robotics experts to develop an automatic deboning system that could help it keep up with demand for chicken and other meats. FedEx started using package-sorting robots to fill in for sick and absent workers in its shipping facilities. Shopping centers, apartment complexes, and grocery stores splurged on cleaning and security robots to keep their stores sanitized and safe, creating shortages among those robots' suppliers.

In all, Covid-19 seemed to speed up the automation timeline by years, if not decades. McKinsey, the giant consulting firm, dubbed it "the great acceleration." Microsoft CEO Satya Nadella claimed that the company had experienced "two years' worth of digital transformation in two months." In March 2020, a survey by the accounting firm EY found that 41 percent of corporate executives were investing more in automation to prepare for a post-coronavirus world. David Autor, an MIT economist and leading automation expert, called the pandemic an "automation-forcing event," and predicted that it would usher in technological trends that would persist long after the virus was gone.

The pandemic has shown us some of the benefits of automation more clearly than any Davos panel could have. Robots and AI allowed companies to keep providing essential goods and services, even as more workers called in sick. Pharmaceutical companies used AI and automated manufacturing to accelerate their search for effective treatments and vaccines. And billions of people, stuck at home and fearful of close contact, relied on the automated, AI-powered services provided by companies like Amazon, Google, and Facebook to keep their shelves stocked and their social lives intact.

At the same time, Covid-19 has also demonstrated some of the limits of automation, and the vast numbers of important tasks we can't yet outsource to machines. We began talking about "essential workers," people whose services were necessary for society to function, and we noticed that many of those people worked not in tech or finance or some other high-prestige field, but in relatively unglamorous industries like nursing, auto

repair, and agriculture. We also noticed that some activities didn't lend themselves well at all to virtualization. After a few months stuck indoors with screens as our only social conduits, many of us felt a strong pull back to the physical world. Some students stuck taking virtual classes started complaining that they weren't learning anything or having any fun. White-collar workers confined to their homes began itching to return to the office, where they could more easily collaborate with their teams and advance their careers. (One tech worker I know grumbled that "nobody is getting promoted over Zoom.") People who had been satisfied with virtual interactions during the pandemic's early months began flouting social distancing rules in order to eat at restaurants, drink at bars, and attend concerts and church services with their friends.

Machines, it turned out, could not offer an adequate substitute for human connection, or give us what we needed to get ahead. And maybe they never will.

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After spending several years studying the past and present of AI and automation, I've found it hard to keep believing in the naive, utopian narrative that claims that these tools are leading us down a well-manicured path to progress and harmony. But I've also found the most dystopian, fatalistic version of the AI story—which claims that intelligent machines are destined to take over the world, and that we can't do anything about it except make peace with our own obsolescence—fairly unsatisfying.

For starters, both the optimists and the pessimists tend to talk about AI and automation in a strangely farsighted way. They focus on the effects these technologies will have years or decades in the future, and neglect to examine the effects they are *already* having.

Whether we realize it or not, most of us interact with dozens of AIs every day—the machine learning models that rank our social media feeds and power our interactions with virtual assistants like Alexa and Siri, the dynamic pricing software that determines how much we pay for hotel rooms and airline tickets, the opaque algorithms that are used to determine eligibility for government benefits, the predictive policing algorithms that law enforcement agencies use to patrol our neighborhoods. All of these systems are vitally important, but few of them get nearly as much scrutiny as the question of whether long-haul truckers will lose their jobs to self-

driving eighteen-wheelers.

And while the mainstream AI and automation debate spends a lot of time talking about AI's impact on narrow measures of economic health, like productivity growth and unemployment rates, it tends to ignore more subjective questions, like whether all of this technology is actually improving people's lives. As experts like Cathy O'Neil, Safiya Umoja Noble, and Ruha Benjamin have observed, badly designed AI can harm vulnerable and marginalized groups even when it "works," by subjecting them to new forms of data-gathering and surveillance and encoding historical patterns of discrimination into automated systems. This harm can take many forms—a résumé-screening algorithm that learns to prefer men's qualifications to women's, a facial-recognition system that has a hard time correctly identifying gender nonconforming people, a predictive risk-modeling system that learns to charge higher interest rates to Black loan applicants—and any responsible discussion of AI and automation needs to grapple with these issues, too.

My biggest problem with the mainstream AI debate, though, is that both sides tend to treat technological change as a disembodied natural force that simply *happens* to us, like gravity or thermodynamics. Both the optimists and the pessimists talk about "algorithms curing diseases" or "robots taking jobs," as if machines can be programmed with both sentience and career ambition. Neither side does a good job of acknowledging that humans are waking up every day and making decisions about how to design, deploy, and measure the effectiveness of these systems.

I hear the "automation is destiny" argument all the time—especially in Silicon Valley, where people tend to talk about technological progress as a speeding train we either have to climb aboard or get run over by—and I get why it's tempting to believe. For a long time, I believed it myself. But it's wrong. And deep down, we all know it's wrong.

From the very first time a *Homo sapiens* rubbed two sticks together to make a fire, technological change has always been driven by human desires. The printing press, the steam engine, social media—these things didn't appear out of nowhere, fully intact and integrated into society. We designed them, created laws and norms around them, and decided whose interests they should serve. Innovation is not an irreversible phenomenon, either, and previous generations have successfully fought to limit the spread of harmful tools such as nuclear weapons, asbestos insulation, and lead paint,

all of which represented technological progress in their day.

Whether you think AI and automation will be great or terrible for humanity, it's important to remember that none of this is predetermined. Executives, not algorithms, decide whether to replace human workers. Regulators, not robots, decide what limits to place on emerging technologies like facial recognition and targeted digital advertising. The engineers building new forms of AI have a say in how those tools are designed, and users can decide whether these tools are morally acceptable or not.

This is the truth about the AI revolution. There is no looming machine takeover, no army of malevolent robots plotting to rise up and enslave us.

It's just people, deciding what kind of society we want.

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This book is not an argument that robots will take all of the jobs, some of the jobs, or none of the jobs. It's not a rant about the horrors of technological capitalism or a rumination about how we'll coexist with machine intelligence. I'm not going to predict when the singularity will arrive or tell you how to get rich building an AI start-up.

This is a book about how to be a human in a world that is increasingly arranged by and for machines. It's an attempt to persuade you that the key to living a happy, rewarding life in the age of AI and automation is not competing with machines head-on—learning to code, optimizing your life, eliminating all forms of personal inefficiency and waste—but strengthening your uniquely human skills, so you're better equipped to do the things machines *can't* do.

If you've ever felt like the world was zooming past you, or worried you have no chance of keeping up with technological change, my hope is to convince you otherwise. I want to help you keep your job. I want to help you build a healthier relationship to technology at home, and coexist peacefully with the algorithms that are trying to change what you buy, where you focus your attention, and how you view the world.

Ultimately, I want to pry our conversation about technology away from the binary poles of euphoria and terror, and foster a more honest discussion of what's coming, and what we can do about it.

Part 1, "The Machines," is an attempt to set the table. I'll draw on my

interviews with experts, my reading of books and research papers, and about three centuries' worth of industrial history to explain why I believe that AI and automation are already having deep, transformative effects on our society, and why we should expect those changes to accelerate in the years ahead. I'll push back on some conventional wisdom about how machines replace workers, and explain why I fear that we've been worrying about the wrong kinds of robots.

Part 2, "The Rules," is the advice part. I'll lay out nine concrete steps you can take to prepare for the future, by protecting your own humanity and capitalizing on your most human qualities, while avoiding some of the harmful effects of today's technology. I'll show examples of people who have successfully navigated technological change this way for centuries, and explain how to apply their lessons to your own life and career.

By the end, I hope you'll share some of my concerns about AI and automation, and the economic, political, and societal challenges they could create in the coming years. But I also hope you'll feel more confident about meeting those challenges. Ultimately, my goal is to convince you that it's possible to become the type of person who has nothing to worry about: a person whose humanity makes them impossible to replace, no matter what AI can or can't do.

You will notice, as you read, that this book focuses more on the micro than the macro. There are no lengthy discussions of productivity measurement or the labor force participation rate, and I don't have a perfect set of AI policy recommendations to share. Preparing our political and economic institutions for technological change is essential, and lots of experts—including some whose work I've included in a reading list at the back of the book—have considered how we might restructure our society for the coming wave of automation. But my primary concern in this book is what *individuals*—people like you and me, with jobs and families and communities to worry about—can do.

You will also notice that I write a fair bit in the first person. That's because I'm on this journey, too. I struggle with my relationship to machines every day, and I worry constantly about my own place in an automated society. (I write for a newspaper, after all, which is not exactly the first occupation conjured by the phrase "job of the future.") Part of the inspiration for this book was selfish—I hoped I would find something, some brilliant insight or irrefutable data point, to put my own mind at ease about what the future had in store for me.

Instead, I found that the future didn't have anything in store for me, because there are no such things as "the future" or "in store." Now, as at every point in history, there are an infinite number of possible outcomes, each determined by the choices we make. If there is a robot apocalypse, it will be one of our own creation. And if this technological revolution makes the world fairer, happier, and more prosperous, it will be because we stopped endlessly theorizing and debating, took hold of our own destinies, and made ourselves futureproof.

—Kevin Roose
Oakland, California
January 2021

Skip Notes

* Quick usage note: In this book, I'm going to use "AI and automation" as a catch-all term for various digital processes that carry out tasks that were previously done by humans. Among computer scientists, "AI" most often refers to a subcategory of automation in which computers are programmed to adapt and learn on their own using techniques like machine learning, and a lot of very smart people get annoyed when you call something "AI" that is really just a static, rule-based algorithm. But this distinction can be fuzzy and mostly lost on the nontechnical reader, so I'll hedge my bets by using both terms whenever possible. Likewise, I will keep my earnest use of "robot"—a term many engineers hate, because it's been tainted by sci-fi movies and can be used to describe everything from droids to dishwashers—to a minimum.

Part I

The Machines

One

Birth of a Suboptimist

The machine's danger to society is not from the machine itself but from what man makes of it.

—Norbert Wiener

The lights dimmed, a guitar lick boomed over the speakers, and a screen behind the stage lit up with the names of robots.

Infosec Auditor Bot—Accenture

Turbo Extractor Bot—Kraft Heinz

Web Monitor Bot—Infosys

It was April 2019, and I was in a hotel ballroom in Manhattan, watching a Silicon Valley start-up called Automation Anywhere show off its latest products to a few hundred corporate executives. These weren't the physical, *beep-boop* robots you see in sci-fi movies. They were all software bots, made of bytes and pixels, that had been programmed to take the place of human workers.

Automation Anywhere's pitch to these executives was simple: *Our bots make better office grunts than your humans.* Bots, after all, can work twenty-four hours a day, seven days a week without getting burned out. They don't take vacations, file HR complaints, or call in sick. And if you replace a human with a bot, you can, in theory, free that human up to do more valuable things.

"Twenty to forty percent of our labor workforce is trapped into acting

like bridges between applications," Automation Anywhere's CEO Shukla Mihir said. When these jobs get automated, he added, "not only are people able to do higher-value work, but you are able to significantly reduce your costs."

The pitch appeared to be working. Despite its low profile, Automation Anywhere has become one of the fastest-growing start-ups in the world, with a valuation of more than $6 billion. The company's bots have been installed more than a million times, including by Fortune 500 giants like Mastercard, Unilever, and Comcast.

Several weeks earlier, I'd visited their headquarters in San Jose at Shukla's invitation. He showed me around the office, an airy single-story building with math equations stenciled on the walls, and took me to a series of four conference rooms designed as tributes to different industrial revolutions.

The first room, called "1760," was decorated as an homage to the original Industrial Revolution, with a set of factory gears hanging on the wall. The second room, known as "1840," had Edison bulbs dangling from the ceiling to commemorate the Second Industrial Revolution of the late nineteenth century. The third room, "1969," had midcentury wallpaper and a disco light. It represented the Third Industrial Revolution—the twentieth-century wave of innovation that included technologies like the microchip, the personal computer, and the internet.

The last conference room was decorated entirely in white. It represented the Fourth Industrial Revolution—the one we're currently living through, defined by accelerating innovation in the fields of AI and automation. And the blank-slate decor, Shukla said, represented the fact that the Fourth Industrial Revolution was unfinished, and that its potential to change our lives for the better was still unfolding.

During our meeting in San Jose, Shukla told me that the age-old question about robots—will they take our jobs?—is fundamentally misguided. In fact, he believes that in many cases, robots *should* take our jobs, because our jobs are wasting our human potential.

"We're trying to pull the robot out of people, and let people achieve greater things," he said.

But in New York, onstage in front of potential clients, Shukla added a more pragmatic layer to his pitch. He told the executives that automation could cut their companies' operating expenses dramatically, and make them