SPECIAL TIME EDITION

ARTIFICIAL INTELLIGENCE

A New Age of Possibilities

USER'S GUIDE

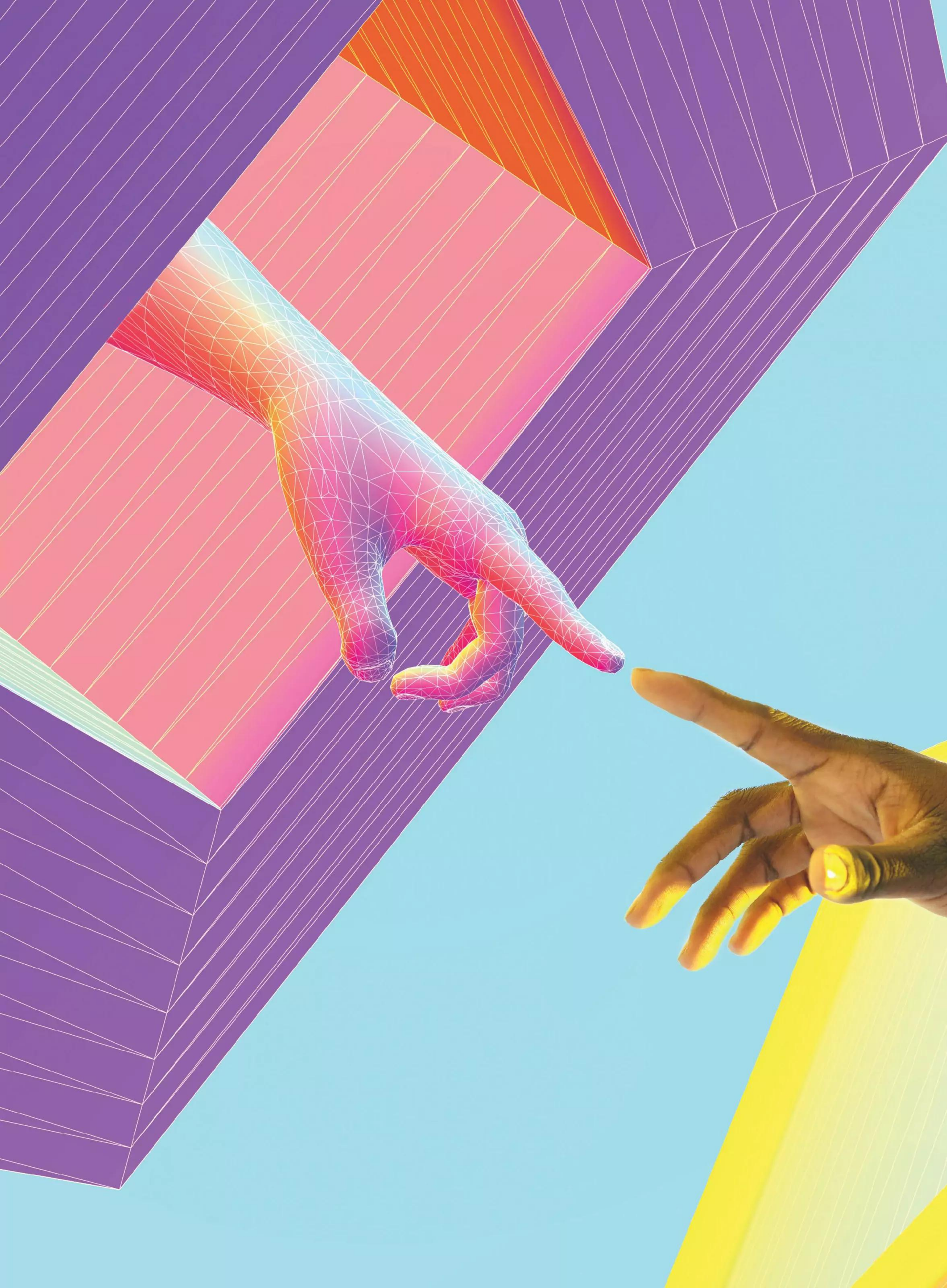
CHATGPT, MIDJOURNEY & MORE

Amazing Innovations

Changing the Way We Work

Could It Replace Us?

THIS IMAGE WAS CREATED BY AI



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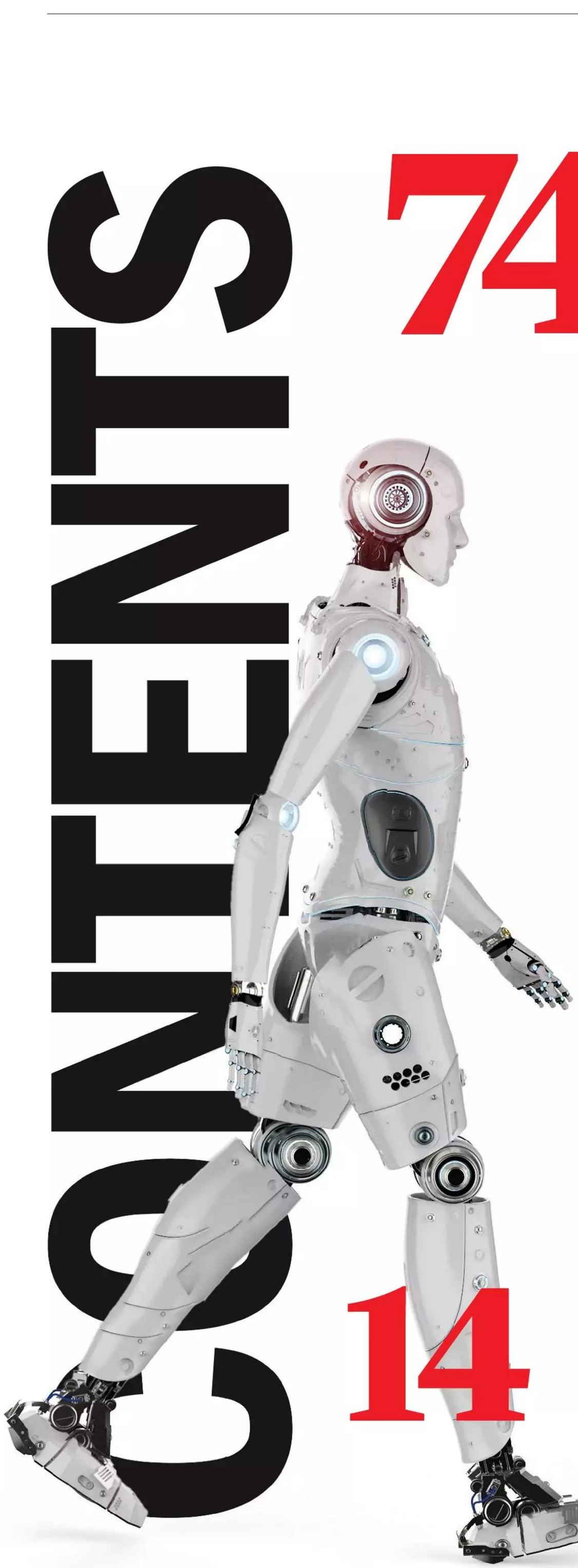

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[SECTION 1]

THE REVOLUTION

Disruptive technologies alter the structure of society and the fabric of our lives. AI may be the biggest game-changer yet.

Artificial intelligence empowers machines with the ability to execute cognitive tasks, much like a human brain.

The AI Arms Race Is Changing Everything

Tech companies are betting big on AI. Are they making the same old mistakes? BY ANDREW R. CHOW AND BILLY PERRIGO

To create is human. For the past 300,000 years we've been unique in our ability to make art, cuisine, manifestos, societies: to envision and craft something new where there was nothing before.

Now we have company. While you're reading this sentence, artificial intelligence (AI) programs are painting cosmic portraits, responding to emails, preparing tax returns, and recording metal songs. They're writing pitch decks, debugging code, sketching architectural blueprints, and providing health advice.

Artificial intelligence has already had a pervasive impact on our lives. AIs are used to price medicine and houses, assemble cars, determine what ads we see on social media. But generative AI, a category of system that can be prompted to create wholly novel content, is much newer.

This shift marks the most important technological breakthrough since social media. Generative AI tools have been adopted ravenously in recent months by a curious, astounded public, thanks to programs like ChatGPT, which responds coherently (but not always accurately) to virtually any query, and DALL·E, which allows you to conjure any image you dream up. In January 2023, ChatGPT reached 100 million monthly users, a faster rate of adoption than Instagram or TikTok. Hundreds of similarly astonishing generative AIs are clamoring for adoption, from Midjourney to Stable Diffusion to GitHub's Copilot, which allows you to turn simple instructions into computer code.

Proponents believe this is just the beginning: that generative AI will reorient the way we work and engage with the world, unlock creativity and scientific discoveries, and allow humanity to achieve previously unimaginable feats. Forecasters at PwC predict that AI could boost the global economy by over $15 trillion by 2030.

This frenzy appeared to catch off guard even the tech companies that have invested billions of dollars in AI—and spurred an intense arms race in Silicon Valley. In a matter of weeks, Microsoft and Alphabet-owned Google shifted their entire corporate strategies in order to seize control of

what they believe will become a new infrastructure layer of the economy. Microsoft is investing $10 billion in OpenAI, creator of ChatGPT and DALL·E, and integrated generative AI into its Office software and search engine, Bing. Google declared a "code red" corporate emergency in response to the success of ChatGPT and rushed its own search-oriented chatbot, Bard, to market. "A race starts today," Microsoft CEO Satya Nadella said in February 2023, throwing down the gauntlet at Google's door. "We're going to move, and move fast."

Wall Street has responded with similar fervor, with analysts upgrading the stocks of companies that mention AI in their plans and punishing those with shaky AI-product rollouts. While the technology is real, a financial bubble is expanding around it rapidly, with investors betting big that generative AI could be as market shaking as Microsoft Windows 95 or the first iPhone.

But this frantic gold rush could also prove catastrophic. As companies hurry to improve the tech and profit from the boom, research about keeping these tools safe is taking a back seat. In a winner-takes-all battle for power, Big Tech and their venture-capitalist backers risk repeating past mistakes, including social media's cardinal sin: prioritizing growth over safety. While there are many potentially utopian aspects of these new technologies, even tools designed for good can have unforeseen consequences. This is the story of how the gold rush began—and what history tells us about what could happen next.

'EVEN THOUGH IN THE LONG TERM I THINK ALL OF THE HYPE IS WARRANTED, THE SHORT-TERM HYPE IS PRETTY DISCONNECTED FROM THE CURRENT REALITY OF THE TECHNOLOGY.'

—Sam Altman, OpenAI CEO

LAYING THE GROUNDWORK

In fact, generative AI knows the problems of social media all too well. AI-research labs have kept versions of these tools behind closed doors for several years, while they studied their potential dangers, from misinformation and hate speech to the unwitting creation of snowballing geopolitical crises.

That conservatism stemmed in part from the unpredictability of the neural network, the computing paradigm that modern AI is based on, which is inspired by the human brain. Instead of the traditional approach to computer programming, which relies on precise sets of instructions yielding predictable results, neural networks effectively teach themselves to spot patterns in data. The more data and computing power these networks are fed, the more capable they tend to become.

In the early 2010s, Silicon Valley woke up to the idea that neural networks were a far more promising route to powerful AI than old-school programming. But the early AIs were painfully susceptible to parroting the biases in their training data: spitting out misinformation and hate speech.

Tech Transformation

HERE'S HOW POWERFUL AIs WENT FROM CLOSELY HELD SECRETS TO PUBLIC PLAYTHINGS.

2015 MARCH
Stanford and Berkeley researchers first describe the diffusion algorithm that would underpin later text-to-image tools

2017 JUNE
Google researchers first describe the transformer algorithm that would turbocharge the power of chatbots

2019 FEBRUARY
OpenAI announces language generator GPT-2, but doesn't release it publicly because of "concerns about malicious applications"

2022 NOVEMBER
OpenAI releases ChatGPT publicly

Meta publishes Galactica, but kills the chatbot after criticism of false answers

When Microsoft unveiled its chatbot Tay in 2016, it took less than 24 hours for it to tweet "Hitler was right I hate the jews" and that feminists should "all die and burn in hell." OpenAI's 2020 predecessor to ChatGPT exhibited similar levels of racism and misogyny.

The AI boom really began to take off around 2020, turbocharged by several crucial breakthroughs in neural-network design, the growing availability of data, and the willingness of tech companies to pay for gargantuan levels of computing power. But the weak spots remained, and the history of embarrassing AI stumbles made many companies, including Google, Meta, and OpenAI, mostly reluctant to publicly release their cutting-edge models. In April 2022, OpenAI announced DALL·E 2, a text-to-image AI model that could generate photorealistic imagery. But it initially restricted the release to a waitlist of "trusted" users, whose usage would, OpenAI said, help it to "understand and address the biases that DALL·E has inherited from its training data."

Even though OpenAI had onboarded 1 million users to DALL·E by July, many researchers in the wider AI community had grown frustrated by OpenAI and other AI companies' look-but-don't-touch approach. In August 2022, a scrappy London-based startup named Stability AI went rogue and released a text-to-image tool, Stable Diffusion, to the masses. Releasing AI tools publicly would, according to a growing school of thought, allow developers to collect valuable data from users—and give society more time to prepare for the drastic changes advanced AI would bring.

Stable Diffusion quickly became the talk of the internet. Millions of users were enchanted by its ability to create art seemingly from scratch, and the tool's outputs consistently achieved virality as users experimented with different prompts and concepts. "You had this generative Pandora's box that opened," says Nathan Benaich, an investor and co-author of the *2022 State of AI Report*. "It shocked OpenAI and Google, because now the world was able to use tools that they had gated. It put everything on overdrive."

OpenAI quickly followed suit by throwing open the doors to DALL·E 2. Then, in November 2022, it released ChatGPT to the public, reportedly in order to beat out looming competition. OpenAI CEO Sam Altman emphasized in interviews that the more people used AI programs, the faster they would improve.

Users flocked to both OpenAI and its competitors. AI-generated images flooded social media and one even won an art competition; visual effects artists for movies began using AI-assisted software for Hollywood hits like *Everything Everywhere All at Once*. Architects are devising AI blueprints; coders are writing AI-based scripts; publications are releasing AI quizzes and articles. Venture capitalists took notice, and have thrown over a billion dollars at AI companies that might unlock the next great productivity boost. Chinese tech giants Baidu and Alibaba announced chatbots of their own, boosting their share prices.

Microsoft, Google, and Meta, meanwhile, are taking the frenzy to extreme levels. While each has stressed the importance of AI for years, they all appeared surprised by the dizzying surge in attention and usage—and now seem to be prioritizing speed over safety. In March 2023, Google released its ChatGPT rival Bard, and according

2023 JANUARY
Microsoft plows $10 billion into OpenAI

2023 FEBRUARY
Microsoft previews new Bing search engine with ChatGPT integration

Meta releases Llama

2023 MARCH
Anthropic launches its AI assistant Claude

Google releases Bard

OpenAI releases GPT-4 in ChatGPT

2023 MAY
A ChatGPT mobile app launches for iOS

Google adds AI to search engine

2023 JULY
Anthropic releases Claude 2

Elon Musk announces his new company xAI, "to understand the true nature of the universe"

2023 SEPTEMBER
Anthropic releases Claude Pro; gets $4 billion from Amazon

ChatGPT rolls out voice and image prompts

Google connects Bard to apps like Gmail

OpenAI unveils DALL•E 3

Meta launches 28 AI personas

Experts disagree about when Artificial General Intelligence (AGI)—systems that can think in superior ways to people—will be developed. Some think it's just a few years away, others many decades from now.

to the *New York Times* said in a presentation that it will "recalibrate" the level of risk it is willing to take when releasing tools based on AI technology. And in June, Meta's CEO Mark Zuckerberg declared his aim for the company was to put generative AI "into every single one of our products," according to Axios.

In this rush, mistakes and harms from the tech have risen—and so has the backlash. When Google demonstrated Bard, one of its responses contained a factual error about the Webb Space Telescope—and Alphabet's stock cratered. After it was released in February 2023, Microsoft's Bing returned some false results. Deepfakes—realistic yet false images or videos created with AI—are being used to harass people or spread misinformation: One widely shared video showed a shockingly convincing version of Joe Biden condemning transgender people.

Companies including Stability AI are facing lawsuits from artists and rights holders who object to their work being used to train AI models without permission. And a TIME investigation found that OpenAI used outsourced Kenyan workers who were paid less than $2 an hour to review toxic content, including sexual abuse, hate speech, and violence.

MONETIZING THE TECH

As worrying as these current issues are, they pale in comparison with what could emerge next if this race continues to accelerate. Many of the choices being made by Big Tech companies today mirror those they made in previous eras, which had devastating ripple effects.

Social media—the Valley's last truly world-changing innovation—carries the first valuable lesson. It was built on the promise that connecting people would make our societies healthier and individuals happier. More than a decade later, we can see that its failures came not from that welcome connectedness, but the way tech companies monetized it: by slowly warping our news feeds to optimize for engagement, keeping us scrolling through viral content interspersed with targeted online advertising. True social connection has become increasingly sparse on our feeds. At the same time, our societies have been left to deal with the second-order implications: a gutted news business, a rise in misinformation, and a skyrocketing teen mental-health crisis.

It's not hard to see AI's integration into Big Tech products going down the same road. Alphabet and Microsoft are most interested in how AI will make their search engines more valuable. [In May 2023, Google launched SGE, an experimental version of its search engine that integrates artificial intelligence answers into results.] But Margaret Mitchell, chief ethics scientist at the AI-development platform Hugging Face, argues that search engines are the "absolute worst way" to use generative AI, because it gets things wrong so often. Mitchell says the actual strengths of AIs like ChatGPT—assisting with creativity, ideation, and menial tasks—are being sidelined in favor of shoehorning the tech into moneymaking machines for tech giants.

If search engines successfully integrate AI, that subtle shift could decimate the many businesses that rely on search, either for ad traffic or business referrals. Nadella, Microsoft's CEO, has said the new AI-oriented Bing search engine will drive more traffic,

and therefore revenue, to publishers and advertisers. But like the brewing pushback against AI-generated art, many in the media now fear a future where tech giants' chatbots cannibalize content from news sites, providing nothing in return.

The question of how AI companies will monetize their projects also looms large. For now, most are free to use, because their creators are following the Silicon Valley playbook of charging little or nothing for products to crowd out competition, subsidized by huge investments from venture-capital firms. While unsuccessful companies adopting this strategy slowly bleed money, the winners often end up with vicelike grips on markets they can control as they see fit. ChatGPT, which is currently ad-less and free to use, is also burning a hole in OpenAI's pocketbook: Each individual chat costs the company "single-digit cents," according to its CEO. The company's ability to weather losses, thanks partly to Microsoft's largesse, gives it a huge competitive advantage.

In February 2023, OpenAI brought in a $20 monthly charge for a subscription tier of the chatbot called ChatGPT Plus. Google already prioritizes paid ads in search results. It's not much of a leap to imagine it doing the same with AI-generated results. If humans come to rely on AIs for information, it will be increasingly difficult to tell what is factual, what is an ad, and what is completely made up.

As profit takes precedence over safety, some warn of existential risk. The explicit goal of many of these AI companies—including OpenAI—is to create an Artificial General Intelligence, or AGI, that can think and learn more efficiently than humans. If future AIs gain the ability to rapidly improve themselves without human guidance or intervention, they could potentially wipe out humanity. An oft-cited thought experiment is that of an AI that, following a command to maximize the number of paper clips it can produce, makes itself into a world-dominating superintelligence that harvests all the carbon at its disposal, including from all life on Earth. In a 2022 survey of AI researchers, nearly half of the respondents said that there was a 10% or greater chance that AI could lead to such a catastrophe.

'WE NEED TO MAKE SURE THAT THE BENEFITS [OF ARTIFICIAL GENERAL INTELLIGENCE] ACCRUE TO AS MANY PEOPLE AS POSSIBLE—TO ALL OF HUMANITY, IDEALLY.'

—Demis Hassabis, Google DeepMind CEO and co-founder

ALIGNED WITH HUMAN VALUES

Inside the most cutting-edge AI labs, a few technicians are working to ensure that AIs, if they eventually surpass human intelligence, are "aligned" with human values. They are designing benevolent gods, not spiteful ones. But only around 80 to 120 researchers in the world are working full-time on AI alignment, according to an estimate shared with TIME by Conjecture, an AI-safety organization. Meanwhile, thousands of engineers are working on expanding capabilities as the AI arms race heats up.

"When it comes to very powerful technologies—and obviously AI is going to be one of the most powerful ever—we need to be careful," Demis Hassabis, CEO and co-founder of Google DeepMind, told TIME in November 2022. "Not everybody is thinking about those things. It's like experimentalists, many of whom don't realize they're holding dangerous material."

Even if computer scientists succeed in making sure the AIs don't wipe us out, their increasing centrality to the global economy could make the Big Tech companies who control it vastly more powerful. They could become not just the richest corporations in the world—charging whatever they want for commercial use of this critical infrastructure—but also geopolitical actors to rival nation-states.

The leaders of OpenAI and Google DeepMind have hinted that they would like the wealth and power emanating from AI to be somehow redistributed. The Big Tech executives who control the purse strings, on the other hand, are primarily accountable to their shareholders.

Of course, many Silicon Valley technologies that promised to change the world haven't. We're not all living in the metaverse. Crypto bros who goaded nonadopters to "have fun staying poor" are nursing their losses or even languishing behind prison bars. The streets of cities around the world are littered with the detritus of failed e-scooter startups.

But while AI has been subject to a similar level of breathless hype, the difference is that the technology behind AI is already useful to consumers and getting better at a breakneck pace: AI's computational power is doubling every six to 10 months, researchers say. It is exactly this immense power that makes the current moment so electrifying—and so dangerous.

—With reporting by Leslie Dickstein and Mariah Espada; updated excerpt from TIME, *Feb. 17, 2023*

At Nearly 70, AI Comes of Age

Even in antiquity, we imagined transcendent machines in human form—today the dream is here. BY BRIANA BROWNELL

Every day there's a new headline about AI surprising us: passing the LSAT, winning an art contest, declaring undying love. But for Adrienne Mayor, historian of ancient science and author of *Gods and Robots*, our current fascination with artificial intelligence is part of a multimillennia-long human drive to get better, smarter, faster, and stronger. "Human enhancement technologies go all the way back to antiquity," she tells TIME. We've come to rely on glasses, hearing aids, and artificial limbs, but when AI is fully realized, it will dramatically exceed today's human limits, allowing us to fully transcend them.

Already, the new slate of generative AI tools promises to make every human more productive, able to learn faster and communicate better—maybe even be a little more creative. The best is yet to come.

In her 1979 history of AI, *Machines Who Think*, Pamela McCorduck calls AI "that audacious effort to duplicate in an artifact what we humans consider to be our most important, our identifying, property—our intelligence." It makes us *us*. Her timeline of AI starts in the sixth century BCE with Homer's *Iliad*, whose golden women were automata, basically robots, blessed with knowledge of the gods.

Most aspects of that *humanness* of our intelligence—spanning mathematics, science, language, strategy, and more—have been explored by AI research. Machines, to people's astonishment, could replicate many of the most fundamental facets of human thought.

In its modern form, AI began its trajectory in the mid-20th century, probably over Christmas holidays 1955. That's when Herbert A. Simon, a founding father of the field (and eventually, a Nobelist in economics), working with his partner, the computer scientist Allen Newell, asked their "thinking machine" to prove theorems in *Principia Mathematica*, the foundation of mathematics. It succeeded, even finding proofs that were more elegant than had been derived by Alfred North Whitehead and Bertrand Russell, the book's authors.

Edward Feigenbaum, a computer scientist who was, at the time, Simon's student, remembers the announcement. When Simon sent his report to the authors, Russell was delighted. "I am quite willing to believe that everything in deductive logic [drawing conclusions from given statements] can be done by a machine," he wrote back.

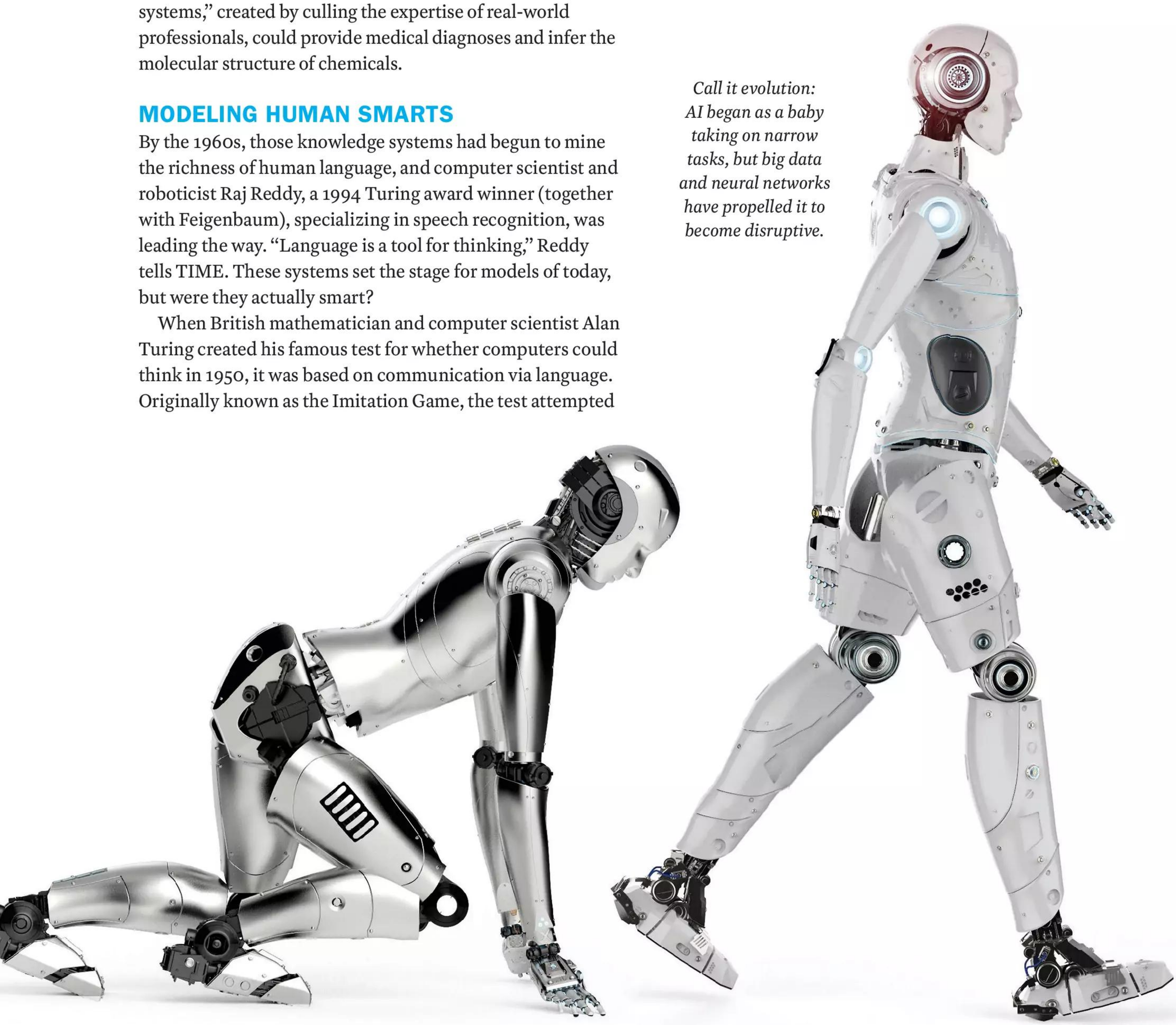
But for Feigenbaum, deductive reasoning was much less interesting than inductive reasoning—the ability to make observations and generalize out; this is how scientists create hypotheses, the scientific method itself. "Science is the profession of induction," Feigenbaum tells TIME. Starting in the 1950s, he began to mine human knowledge and systematize it into AI, developing technologies that could support scientific reasoning. It worked: These "knowledge systems," created by culling the expertise of real-world professionals, could provide medical diagnoses and infer the molecular structure of chemicals.

MODELING HUMAN SMARTS

By the 1960s, those knowledge systems had begun to mine the richness of human language, and computer scientist and roboticist Raj Reddy, a 1994 Turing award winner (together with Feigenbaum), specializing in speech recognition, was leading the way. "Language is a tool for thinking," Reddy tells TIME. These systems set the stage for models of today, but were they actually smart?

When British mathematician and computer scientist Alan Turing created his famous test for whether computers could think in 1950, it was based on communication via language. Originally known as the Imitation Game, the test attempted to determine whether a machine could fool an interrogator into thinking it was human following a blinded conversation with it. That test was revolutionary at the time, and it served as a gold standard for machine intelligence for decades—and for decades, machines failed. Humans could always tell.

AI would first prove its smarts in a different domain when in 1997, IBM's Deep Blue supercomputer defeated world chess champion Garry Kasparov. The kind of



Call it evolution: AI began as a baby taking on narrow tasks, but big data and neural networks have propelled it to become disruptive.

strategic thinking required to become a grandmaster takes a special kind of creativity, long believed to be among the most unique types of human thought. After all, the thinking of a chess grandmaster is beyond most humans. Since the AI could look many more moves ahead, it surprised onlookers with its foresight. "And they would say that's stunning. That's brilliant. That's incredibly creative," computer scientist Oren Etzioni, founding CEO of the Allen Institute for Artificial Intelligence, tells TIME.

The issue is, Reddy says, "when you look at the inside of it…it's all kind of boring stuff: Brute force. But computers can come up with solutions for all kinds of difficult problems, which, when done by a human being, would be thought to be creative."

GETTING CREATIVE

Then, about a decade ago, chatbots got good enough to challenge the Turing Test. Eugene Goostman, a chatbot programmed to imitate a 13-year-old Ukrainian boy with poor English, was mistaken for a human by a third of judges after a five-minute conversation. Its answers were so flip, and its English so adolescent and flawed, it was able to pull it off. In one exchange, Goostman asked a TIME journalist for an invitation to visit him in Seattle.

"I don't live there anymore and it would be weird for me to house a 13-year-old boy no matter where I lived," Doug Aamoth, the reporter said.

"Possibly, it will be a big surprise for you, but 'no' isn't the only answer. The word 'yes' also exists! :-) Wonna ask me something more?" Goostman responded, somewhat sounding like a teen. Some considered interactions with Goostman a true encounter with another mind, while others challenged its usefulness as a test for anything approaching smarts.

As a result, several other tests were suggested, including the Winograd Schema Challenge, a multiple-choice test for ambiguity and common sense, and the Marcus Test, in which an AI would watch a video and answer questions about its content. In 2014, Mark Riedl proposed the Lovelace 2.0 Test, named after 19th-century mathematician Ada Lovelace. To pass this test, an AI has to develop a unique, creative product that would generally require human-level intelligence to make. "Creativity is not unique to human intelligence," Riedl, a professor in the Georgia Tech School of Interactive Computing, said on the BBC, "but it is one of the hallmarks of human intelligence." Creativity is multifaceted, and the Lovelace 2.0 Test moves away from scientific and mathematical creativity to generating "creative artifacts" including "paintings, poetry, stories, architectural designs." Current AI tools may be close to passing this test, too.

A PERMANENT FOOTHOLD

For Reddy, today's landscape is a continuation. "We were doing the same kinds of things that we are trying to do now." Key among those: machine learning, in which computers learn from data rather than being explicitly programmed. For decades,

FROM LEFT *Portrait of Ada Lovelace, an English mathematician considered the world's first computer programmer; the DEUCE: Digital Electronic Universal Computing Engine, the first commercially-produced digital model developed from earlier plans by Alan Turing; world chess champion Garry Kasparov makes a move during his fourth game against the IBM Deep Blue chess computer in 1997; trivia whiz Ken Jennings competes—and loses—against IBM's Watson, a successor to Deep Blue, in a 2011 game of* Jeopardy!

data was scarce, expensive to gather, and, at times, impossible to collect. Computers were slow and expensive. Now that has all changed.

When Feigenbaum created his first knowledge systems, he says, "we were mining ingots of gold out of the heads of practitioners. Today, they're scooping up gold dust from the sand."

Using this "knowledge dust" requires a different kind of brute force—thousands or millions of cases for computers to learn patterns with machine learning. When Feigenbaum looked at protein folding early in his career, only one protein's structure was known: hemoglobin. Now we know over 100,000 protein structures, enabling AlphaFold, an AI program developed by DeepMind, to make discoveries that can target treatments and uncover the cause of disease.

The internal machinations of today's AI may be energy guzzling, overly convoluted, impossible to comprehend, but they dramatically expand our abilities—and our world. "ChatGPT has read 100 million books. If you read a book every day, by the end of your life, you would have read 40,000 books. So there's no way any human being can have as much knowledge," Reddy says.

'IF A MACHINE CAN THINK, IT MIGHT THINK MORE INTELLIGENTLY THAN WE DO, AND THEN WHERE SHOULD WE BE?'

—Alan Turing, mathematician and computer scientist, in 1951

A confluence of trends has made this moment: fast computers and access to massive amounts of data. Neither will vanish, allowing AI to establish a permanent foothold in the mountain of technological progress.

"Our overnight success has been 70 years in the making," Etzioni says. And this tech is not just restricted to government-funded labs or trillion-dollar tech conglomerates; millions around the world now have an educator, illustrator, sommelier, therapist, programmer in their pocket.

Our collective imagination, facilitated by AI, could do much to bring about our shared future. Mayor thinks of those mythical robots from the past as thought experiments fueling the future we inhabit now. These myths from the past make a map, she tells TIME. "Wherever science fiction goes, technology follows."

As for creativity, Feigenbaum sees the future as one of enhancement. "It's going to be smart humans, assisted by intelligent machines." Will a computer ever win a Nobel Prize? Probably not, but someday the honor may "go to a human-machine pair."

Wherever AI goes next, it's comforting that the field's creators, like Reddy, remain optimistic. "The future is unknowable," he tells TIME. "But one thing is for sure: Great and exciting things will happen."

The Big Players

Meet some of the leaders, pioneers, innovators and thinkers who are shaping today's AI landscape.

DEMIS HASSABIS

CEO and Co-Founder, Google DeepMind

When Demis Hassabis was a young man, he helped design *Theme Park*, a computer game that gave the player a God's-eye view of a sprawling fairground business. Ever since then, Hassabis, who leads Google DeepMind, one of the top AI labs, has been trying to attain a God's-eye view of the world.

Google DeepMind is developing a large AI model called Gemini, which Hassabis has hinted might be able to outperform OpenAI's GPT-4. (The model, which at press time was rumored to be out in December, will be "multimodal:" meaning it is trained on—and can input and output—not just text but other media, like images.)

Will Gemini be a bigger version of what has come before, or is there something architecturally different about the way it is designed?
Think of Gemini as a series of models rather than a single model, although obviously, there will be individual models of different sizes. So it's a combination of scaling and innovation.

Are there any capabilities that, if Gemini exhibited them in your testing phase, you'd decide: "No, we cannot release this"?
The most pressing thing that needs to happen in the research area of AI is to come up with the right evaluation benchmarks for capabilities. The problem is, we don't have those types of benchmarks. We have ideas about it, like, is this system capable of deception? Can it replicate itself across data centers? These are the sorts of things you might want to test for. But you need really rigorous definitions if you want to make a practical, pragmatic test for them.

Can you tell us about the formation of Frontier Model Forum, an industry body that is focused on ensuring responsible development of AI models?
It's about the leading companies trying to come together to do more AI safety research. I'm not worried about today's systems. But I could foresee several generations from now that we will need something more rigorous than just looking at the amount of compute they used.—*Billy Perrigo*

ELON MUSK

Founder, xAI

The richest man in the world is deathly afraid of AI. He's also aggressively aiding its development. Elon Musk became interested in how AI might benefit—or destroy—humanity in the early 2010s. He invested millions into the AI startup DeepMind and co-founded OpenAI with Sam Altman in 2015, but has referred to OpenAI as a "profit-maximizing demon from hell." [He resigned from its board in 2018.] He has also criticized ChatGPT for being "politically correct" and pledged to build his own chatbot called "TruthGPT." Whether or not that comes to fruition, Musk has his hands full with AI projects, including his new company xAI, which was announced in July 2023 to "understand the true nature of the universe"; self-driving cars at Tesla; Neuralink, which aims to plant microchips into brains that would enable people to talk to computers directly; and Optimus, a human-like robot designed to navigate the physical world. Even as Musk races ahead, he loudly voices his concerns about the threats AI could pose to humanity. In March 2023, he signed an open letter calling for a pause on AI development and training. Musk's enormous wealth alone ensures he will remain among the most influential power players in AI. But he also stands out for the tension between his contradictory views on its risks and rewards. —*Andrew R. Chow*

DARIO AND DANIELA AMODEI

CEO & President, Anthropic

As siblings go, Dario and Daniela Amodei agree more than most. "Since we were kids, we've always felt very aligned," Daniela says.

Alignment is top of mind for the duo at the helm of Anthropic, one of the world's leading AI labs that recently got a $4 billion investment from Amazon. The term means ensuring AI systems are "aligned" with human values. Dario and Daniela—CEO and president of Anthropic, respectively—believe they are taking a safer, more responsible approach to AI alignment than others.

Anthropic, founded in 2021, has carried out "mechanistic interpretability" research that aims to allow developers to carry out something analogous to a brain scan—to see what's really going on inside an AI system, rather than relying on its text outputs alone. Anthropic has also developed Constitutional AI, a radical new method for aligning AI systems. It has embedded those approaches into its latest chatbot, Claude 2, a close competitor to GPT-4, OpenAI's most powerful model.

'OUR EXISTENCE IN THE ECOSYSTEM HOPEFULLY CAUSES OTHER ORGANIZATIONS TO BECOME MORE LIKE US.'

—Dario Amodei

Constitutional AI allows developers to explicitly specify the values their systems should adhere to, via the creation of a "constitution," separating the question of whether an AI can do something from the more politically fraught question of whether it *should*. The other leading method for AI alignment—called reinforcement learning from human feedback (RLHF)—can often result in those two questions being "mixed together," Dario says. Research from Carnegie Mellon shows that chatbots with more RLHF training tend to give more socially and economically liberal answers than those that don't. That could be because the training process often rewards the models for being inclusive and inoffensive. Constitutional AI allows developers to instill a codified set of values into an AI rather than letting them be implicitly and imperfectly set via RLHF.—*Will Henshall and B.P.*

SAM ALTMAN

CEO, OpenAI

Sam Altman gives humanity a lot of credit. The human race is smart and adaptable enough, he believes, to cope with the release of increasingly powerful AIs into the world—so long as those releases are safe and incremental. "People are much smarter and savvier than a lot of the so-called experts think," Altman, the CEO of OpenAI, told TIME in May 2023. "We can manage this."

That philosophy not only explains why OpenAI decided to release ChatGPT, its world-shaking chatbot, in November 2022. It's also why the company doubled down a few months later and launched GPT-4, the most powerful large language model ever made available to the public.

As well as making Altman, a former president of startup accelerator Y Combinator, one of the hottest names in tech, these releases proved him right, at least so far: Humanity was able to quickly adapt to these tools without collapsing in on itself. Lawmakers—propelled in equal measures by fear and awe—began seriously discussing how AI should be regulated, a conversation Altman has long wanted them to begin in earnest. "It is our responsibility to educate policymakers and the public about what we think is happening, what we think may happen, and to put technology out into the world so people can see it," Altman says. "It is our institutions' and civil society's role to figure out what we as a society want." (For more on Altman, turn to page 58.) —*B.P.*

MEREDITH WHITTAKER

President, Signal

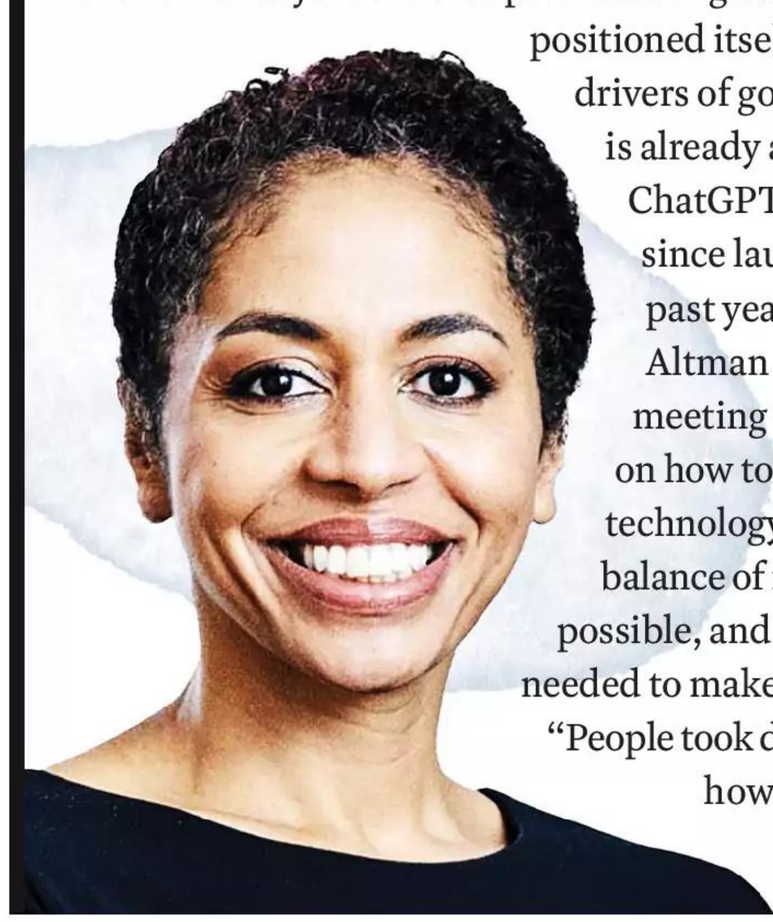
Meredith Whittaker's job as president of Signal is not as unconnected from the world of AI as you might think. Tech companies collect vast quantities of data to train their AI systems, scraping billions of images and words of text from the internet—often without the consent of their creators. That might include your profile pictures, restaurant reviews, tweets, or Wikipedia edits. "It is fundamentally unethical that the meaning-making, the creative labor, and the work of hundreds of millions of people is being scraped, aggregated, and used to create systems that will undermine the livelihoods and the ecosystem of mutual understanding that we create for each other," Whittaker says.

Signal's encrypted messaging service, which prevents texts and data being intercepted by anyone except the intended recipients, is one small but symbolic step toward an alternative system. "The Venn diagram of privacy concerns and AI concerns is a circle," Whittaker tells TIME over an encrypted video call. "Signal is working within the tech industry ecosystem, against it. It is trying to create something that interrupts the data pipelines."—*B.P.*

ANNA MAKANJU

Vice President of Global Affairs, OpenAI

There's a good chance that whatever AI regulations emerge across the world in the next few years, Anna Makanju will have left her fingerprints on them. Makanju is the vice president of global affairs at OpenAI, which has positioned itself as one of the industry's foremost drivers of good-faith regulation. The company is already a leader in the AI sector—with ChatGPT becoming a household name since launching in November 2022. This past year, Makanju and OpenAI CEO Sam Altman have been traveling the world, meeting with leaders, and advising them on how to wrangle with this rapidly emerging technology. "Everyone is trying to strike this balance of making sure that innovation is still possible, and that it has the guardrails that are needed to make sure it goes well," Makanju says. "People took different views of what that means or how that should be done. But overall, that was really what we heard everywhere in the world."—*A.R.C.*



CLÉMENT DELANGUE

CEO and Co-Founder, Hugging Face

Clément Delangue is the CEO of Hugging Face, an open-source, for-profit machine-learning platform where researchers convene to share their AI models, datasets, and best practices. In an industry where the cutting edge is dominated by big tech companies, Delangue says efforts like Paris-based Hugging Face are an essential counterweight, helping distribute AI to a far broader base of users and developers. At the same time, Hugging Face can enforce a set of community standards that prevents harmful AI models from proliferating, he says. (Investors in Hugging Face include Salesforce, where TIME co-chair and owner Marc Benioff is CEO.) "We've been lucky to become the most-used platform to share science, models, datasets, apps. We are a big proponent of more transparency, more openness, more distribution of power in terms of AI capabilities," he says. "On the Hugging Face platform now, you can release models that you only share with a subset of people—for example if you want to share a model only for research purposes. We're trying to maximize safety and ethical releases, allowing for safer releases, while making sure we build a platform with value-informed processes within the organization."—*B.P.*

RUMMAN CHOWDHURY

CEO and Co-Founder, Humane Intelligence

In August 2023, 4,000 hackers gathered in Las Vegas to break chatbots from OpenAI, Google, and Anthropic. Hackers who were able to persuade the AIs to act in ways that broke their own rules—giving the recipe for anthrax, say—were rewarded with points, with the winner finding several vulnerabilities. The event was co-organized by Rumman Chowdhury, an AI ethicist and the founder of Humane Intelligence, a nonprofit that specializes in this so-called red teaming of AI systems. Chowdhury spoke to TIME about the dangers of AI.

'IT IS AMAZING HOW MANY PEOPLE, EVEN IF THEY'RE AN EXPERT, CONFUSE A USER DESIGN THAT MIMICS CHAT FUNCTIONALITY AS SENTIENCE.'

—Rumman Chowdhury

What concerns you most about the way AI is being adopted right now?
That it leads to an increased centralization of power and wealth into fewer and fewer people's hands. So, for example, the pictures we have of ourselves on the internet, the conversations we've had with our friends on social media—they've literally scraped and taken what we've all freely contributed to the internet to make it an interesting place. And they're monetizing it and charging us for the output that they gain wealth from, while also taking away the livelihoods of many different people.

What is the thing that you wish more people understood about AI?
That it's not magic. It's simply math, put into code. That people think of programmers as uniquely capable entities that are smarter than everybody else; also wildly untrue. These people cultivate a mystique around the technology they build with the purpose of excluding others. And people are too scared to critique AI, or to ask if it's doing the right thing. They think it is better at making decisions than even an expert in a particular field could be.—*B.P.*

ALONDRA NELSON

Researcher at the Institute for Advanced Study and Policy Adviser

When the Biden White House was tasked with responding to the rapid changes in generative AI last year, Alondra Nelson led the charge. As the director of the White House Office of Science and Technology Policy (OSTP), Nelson oversaw the release of the Blueprint for an AI Bill of Rights in October 2022. The document lays a framework that she hopes both AI builders and policymakers will abide by in order to ensure that AI is a force for public good. "Fueled by the power of American innovation, these tools hold the potential to redefine every part of our society and make life better for everyone," the document reads.

Nelson also hopes the 73-page document—which identifies a collection of best practices for industry players, including stress-testing AI systems before they are publicly deployed, and continual audits—will spur Congress to pass AI legislation as soon as possible.

"The bottom line for the President is, how does this help families?" says Nelson, who departed the White House in February 2023. "Is this providing economic security? Is it helping people keep or gain jobs that are good and meaningful?" Nelson is hopeful: "I'm optimistic that people are responding to this moment with the gravity it requires."—*A.R.C.*

SHANE LEGG

Co-Founder and Chief AGI Scientist, Google DeepMind

Shane Legg doesn't know what life will look like if we survive the development of superintelligent AI. "It's hard for us with just human intelligence to know what's going to happen," says Legg. But as the Chief AGI Scientist at Google DeepMind, where he leads the technical safety team, he is trying to ensure that powerful AI systems, once developed, will behave as their creators intend, and prevent the kind of catastrophe caused by an AI system that develops harmful goals on its own. Legg estimates that there is a 70% chance that he and others will have solved this problem by 2028. He argues that many of the difficulties that early researchers foresaw in making AI systems behave, like making sure they understand human values, have been addressed by work that has happened since. Legg thinks we can get it right: "The world could become a much, much better place."—*W.H.*

JENSEN HUANG

CEO, President and Co-Founder, Nvidia

Stunning visuals have been a lifelong obsession for Jensen Huang. Once, when he was just 8 years old, Huang sprayed lighter fluid on a swimming pool and jumped in just to watch the flames dance from below the surface. "Unbelievable," he recalled, during a talk show in China. "I still remember the beautiful images."

Huang parlayed that passion into an entire industry when in 1993 he founded Nvidia, whose original remit was building graphics cards for increasingly fantastical and immersive video games. Today, however, Huang's firm, based in Santa Clara, Calif., is the world's dominant producer of the microprocessors that power the AI revolution. Demand for Nvidia's chips has soared with the explosion of large language models such as ChatGPT, with the firm's latest GH200 processor, unveiled in August 2023, significantly slashing algorithm-training time. "We have reached the tipping point of a new computing era," he told the Computex conference in Taipei in May 2023.—*Charlie Campbell*

'EVERYONE IS A PROGRAMMER NOW. YOU JUST HAVE TO SAY SOMETHING TO THE COMPUTER.'

—Jensen Huang

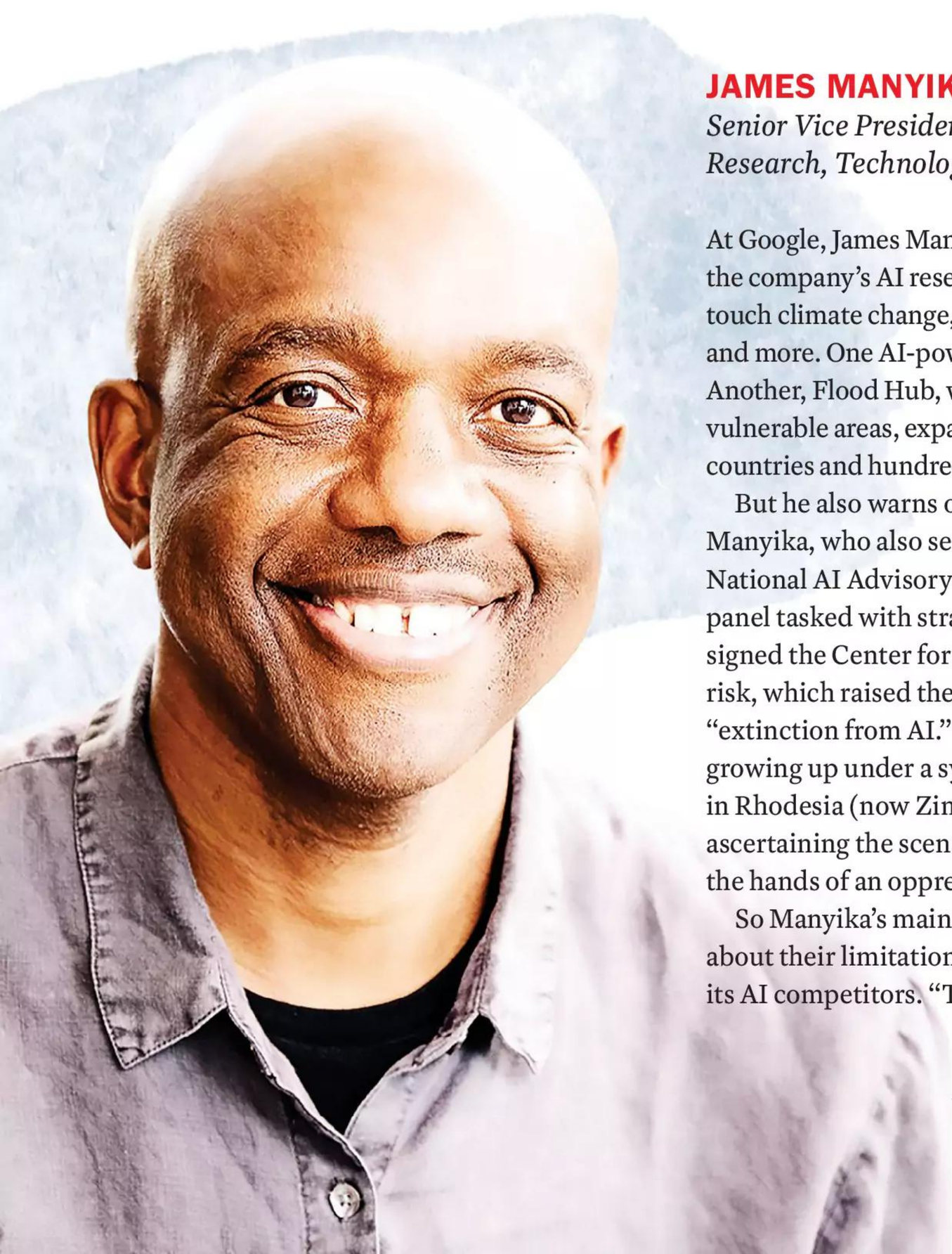
FEI-FEI LI

Professor, Stanford University

AI won't be the first time technology has changed the world, Fei-Fei Li points out, and each time the change is for the better. "If we…teleport ourselves into any moment in history—the moment fire was discovered, the steam engine was made, electricity—the discussions will be similar: the double-edged sword of technology. Technology is empowering, but with that power comes danger. The same goes with AI."

Li knows more than most about the promise and the perils she describes. Her research laid the foundations for the image-recognition AI systems operating today and expanded the use of AI for health care. She has been a vocal advocate for diversity in AI as a co-founder of AI4ALL, a U.S.-based nonprofit aiming to increase diversity and inclusion in AI.

At a meeting with President Biden in June 2023, Li called for a "moonshot mentality," arguing for ambitious government investment to ensure that AI is harnessed to serve the public good. In particular, Li, as a member of the National Artificial Intelligence Research Resource (NAIRR) Task Force, has called for government provision of AI computing resources. In July 2023, the leadership of the Congressional Artificial Intelligence Caucus introduced a bill that would establish NAIRR, to provide researchers with the resources required to develop AI safely. Watching *Oppenheimer* with her children, Li, who is co-director of the Stanford Institute for Human-Centered AI, was struck by the similarities between the movie and the moment. "I do resonate really, really deeply with the sense of responsibility that scientists have. We're all citizens of the world."—*W.H.*



JAMES MANYIKA

Senior Vice President, Research, Technology & Society, Google

At Google, James Manyika has a wide purview over the company's AI research and products, which touch climate change, health care, entertainment, and more. One AI-powered project tracks wildfires. Another, Flood Hub, which forecasts flood risk in vulnerable areas, expanded in 2023 to serve 80 countries and hundreds of millions of people.

But he also warns of AI's risks. In May 2023, Manyika, who also serves as a vice chair of the National AI Advisory Committee, the federal panel tasked with strategizing AI regulation, signed the Center for AI Safety's statement on AI risk, which raised the possibility of humanity's "extinction from AI." Manyika says his experience growing up under a system akin to apartheid in Rhodesia (now Zimbabwe) had a "deep impact" on his approach to AI and ascertaining the scenarios that should be prevented. Facial-recognition tools in the hands of an oppressive government, for example, could be disastrous.

So Manyika's main priority is to develop products safely and to be transparent about their limitations—even if that means that Google sometimes lags behind its AI competitors. "The only race here is to get it right," he says.—*A.R.C.*

For more on the TIME100 "Most Influential People in Artificial Intelligence" Oct. 9, 2023, cover story, go to *time.com/time100-ai*

These profiles have been condensed and edited for clarity.

Do We Face an Existential Threat?

In a frank exploration of the potential peril, three deep learning pioneers explore whether AI might really destroy the human species, or even replace it.

THE CATASTROPHISTS

GEOFFREY HINTON
Emeritus Professor, University of Toronto

Over the course of February 2023, Geoffrey Hinton, one of the most influential AI researchers of the past 50 years, had a "slow eureka moment."

Hinton has spent his career trying to build AI systems that model the human brain, mostly in academia before joining Google in 2013. He had always believed that the brain was better than the machines that he and others were building, and that by making them more like the brain, they would improve. But early in 2023, he realized "the digital intelligence we've got now may be better than the brain already. It's just not scaled up quite as big."

Developers around the world are currently racing to build the biggest AI systems that they can. Given the current rate at which AI companies are increasing the size of models, it could be less than five years until AI systems have 100 trillion connections—roughly as many as there are between neurons in the human brain.

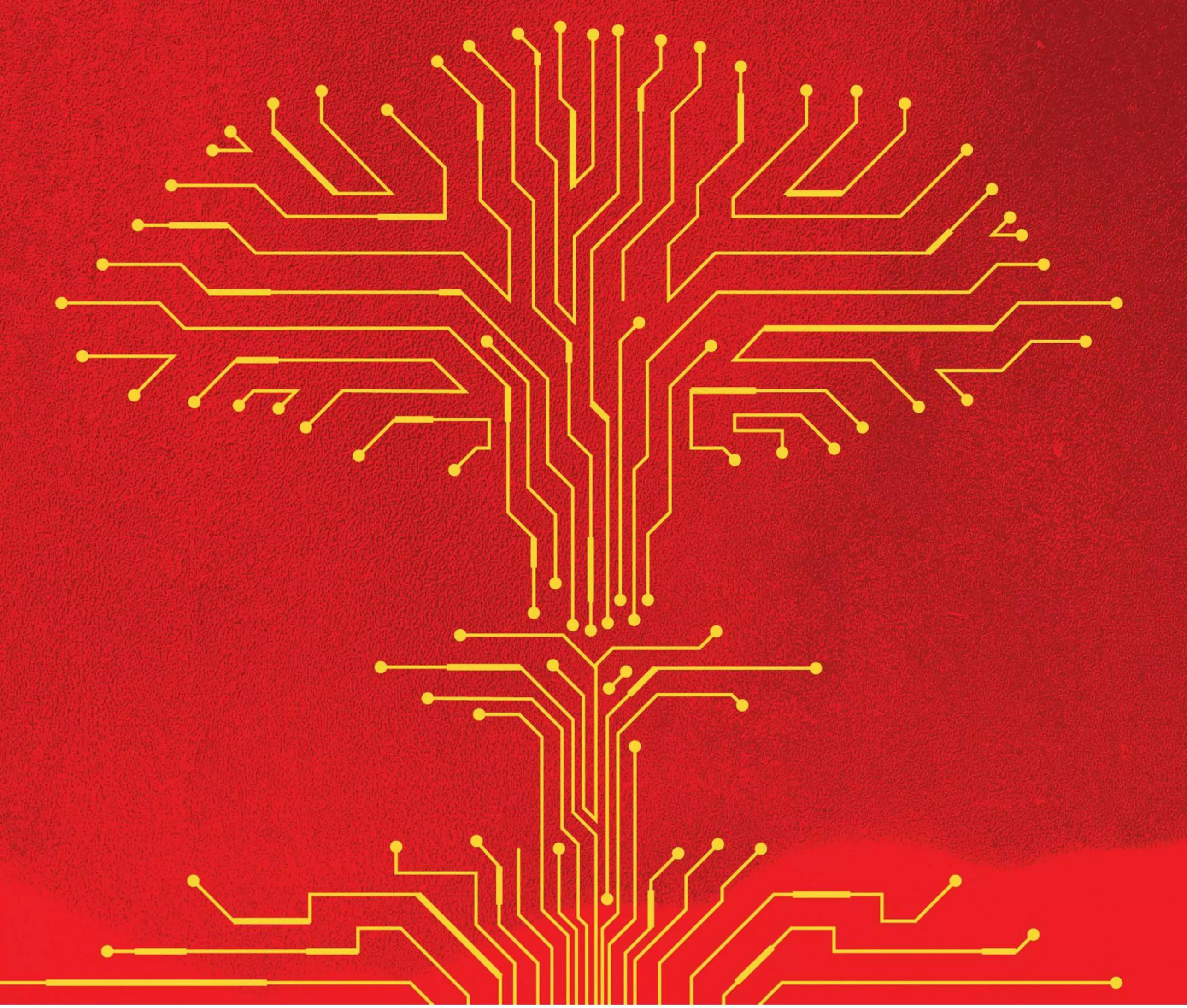
Alarmed, Hinton left his post as VP and engineering fellow in May 2023 and gave a flurry of interviews in which he explained that he had left in order to be able to speak freely on the dangers of AI—and his regrets over helping bring that technology into existence. He worries about what could happen once AI systems are scaled up to the size of human brains—and the prospect of humanity being wiped out by the technology he helped create. "This stuff will get smarter than us and take over," says Hinton. "And if you want to know what that feels like, ask a chicken."

The human brain always fascinated Hinton. At Cambridge University, he graduated with a degree in experimental psychology in 1970. He started a Ph.D. in AI at the University of Edinburgh, then the U.K.'s only postgraduate program on the subject, in 1972.

In the 1970s, artificial intelligence, after failing to live up to its postwar promise, was going through a period of dampened enthusiasm, and in this unfashionable field, Hinton pursued an unpopular idea: AI systems known as neural networks, which mimicked the structure of the human brain. His thesis adviser urged him on a weekly basis to change his approach. Each time he replied, "Give me another six months and I'll prove to you that it works."

Upon completion of his Ph.D., Hinton moved to the U.S. and published pathbreaking research, for which he was awarded the 2018 Turing Award, in posts at universities across the U.S., before eventually taking a professorship in computer science at the University of Toronto.

In 2012, Hinton and two of his graduate students, Alex Krizhevsky and Ilya Sutskever, the latter now chief scientist at OpenAI, joined forces and entered ImageNet, a once annual competition in which researchers competed to build the most accurate image-recognition AI systems. They dominated the competition—an emphatic



"We should worry seriously about how we stop these things getting control over us," Geoffrey Hinton said in May 2023.

demonstration that neural networks had come of age. Hinton's persistence had paid off.

He and his students set up a shell company called DNNresearch to auction their expertise, and four tech firms—Google, Microsoft, Baidu, and DeepMind—bid tens of millions for the company. Hinton chose Google over the final bidder, Baidu. In 2013, he joined Google Brain, the cutting-edge machine-learning team he left in May.

Hinton has been instrumental in the development and popularization of neural networks, the dominant AI development paradigm that has allowed huge amounts of data to be ingested and processed, leading to advances in image recognition, language understanding, and self-driving cars. His work has potentially hastened the future he fears, in which AI becomes superhuman with disastrous results.

Hinton does not know how to prevent superhuman AI systems from taking over. If there's any hope, he says, it lies with the next generation. Many scientists switch to policy work later in their careers, but he declined Google's offer to take such a role at the company: "I've never been very good at or interested in policy issues," he tells TIME. "I'm a scientist."

Instead, Hinton is sounding the alarm, giving interviews to raise public awareness and speaking with policymakers, including officials in the U.K. Prime Minister's office, Canadian Prime Minister Justin Trudeau, and U.S. Senators Bernie Sanders and Jon Ossoff.

While on a theoretical level he grasps the risks from AI, Hinton says that his emotions haven't yet caught up. "The idea that we're going to be replaced as the apex intelligence is just very hard to get your head around."—*Will Henshall*

YOSHUA BENGIO

Scientific Director, Montreal Institute for Learning Algorithms

Yoshua Bengio, one of the most important AI researchers of the past three decades, understands what AI can do better than most. Still, upon encountering ChatGPT, he had a "visceral" reaction. It took him all winter and much of spring to begin to intellectually—and emotionally—adjust to his new understanding of how quickly AI could surpass humans.

"It's very challenging psychologically to realize that what you've been working for, with the idea that it would be a great thing—for society, for humanity, for science—may actually be catastrophic," Bengio says, speaking in August 2023 from his home in Montreal. "It's like you think you'd been acting well all your life and then somebody [tells you] you've been actually building a bomb that's going to kill everyone."

In March 2023, Bengio spoke out about the risks AI poses, just weeks before Hinton did as well. "Geoff and I came to very similar conclusions… without talking to each other," says Bengio, who has been a professor at the University of Montreal for more than three decades. Bengio and Hinton separately estimate that AI that outperforms humans at all tasks will be developed at some point in the next five to 20 years.

'I'M CONCERNED THAT POWERFUL TOOLS CAN HAVE NEGATIVE USES AND SOCIETY IS NOT READY TO DEAL WITH THAT. LET'S SLOW DOWN. LET'S MAKE SURE WE DEVELOP BETTER GUARDRAILS.'

—Yoshua Bengio

Bengio has been part of teams which have made breakthroughs that have helped lay the groundwork for the recent advances in AI. In 2003, he laid the foundations for modern large language models (LLMs) by showing that neural networks could learn patterns in human language by predicting the next word, like autocorrect. In 2014, working with Ian Goodfellow, Bengio came up with a way to train AIs by having two compete against each other, one generating content and the other judging its quality. And in 2018, Bengio helped develop the concept of attention–adapting neural networks to understand highly connected data like social networks by focusing on the most relevant parts.

Now, Bengio intends to harness his intellectual horsepower thinking hard about the current situation, which he says "looks desperate for humanity." AI could overpower us in the future, he says. But things could get tricky well before then. "The nearest thing is meddling with elections," says Bengio. "That could happen by the next U.S. election." In 2023, he testified before the U.S. Senate about the dangers of AI, and has written papers about AI policy and governance. He intends to shift his work toward technical AI-safety research.

"The real question when you're in any situation is, What can I do to reduce those risks? I can't bring them to zero. It's not clear that anybody can," Bengio says. "But if we can reduce the probability of bad things by a factor of 10, well, let's do it." —*W.H.*

Yann LeCun, Hinton, and Yoshua Bengio were the recipients of the 2018 ACM A.M. Turing Award, considered the "Nobel Prize" for computing.

THE OPTIMIST

YANN LECUN

Chief AI Scientist, Meta

Yann LeCun has long marched to the beat of his own drum. After the French computer scientist hypothesized in the 1980s that artificial neural networks could be designed to imitate the human brain, his ideas were widely mocked as fantastical for decades. But thanks to technical breakthroughs in the field, LeCun's ideas would forge the bedrock for the current generative-AI revolution.

These days, LeCun, now the chief AI scientist at Meta and a computer science professor at NYU, is still offering bold, controversial proclamations—and sparring with everyone and anyone he disagrees with. "I could stay silent, but it's not so much my style," he tells TIME in a video interview.

LeCun has dismissed existential fears around AI as "preposterous" and akin to an "apocalyptic cult." He believes the current craze around large language models—including ChatGPT—is a misdirected fad that will soon hit a dead end.

You've called AI doomers "preposterous." Why are you so sure this technology will not threaten the world?

The Eliezer Yudkowskys of the world are saying, "If you get it slightly wrong and just turn on this superintelligent system, it will immediately take over the world and escape our control." But that's not the way it will work. It's like if you said in 1960, "We'll build the first transatlantic jet. We won't test it beforehand. We'll just build it, put a thousand people in it, fly it across the Atlantic, and hope it doesn't blow up." Of course, that would be stupid.

It took decades for airliners to become supersafe: decades of fine-tuning and careful engineering. We're in the same situation for AI. A lot of people say AI is not safe. But they are naive. They have no idea. It's a complicated engineering problem that we haven't even begun to solve because we don't even have a good design for a superintelligent AI system yet.

Now, a lot of the AI researchers themselves cannot imagine how to make those systems safe. I think there's a way to make them safe by designing them so that they have to abide by a certain number of objectives. You hard-wire those objectives so the system, by construction, cannot produce an output that does not abide by the guardrails in the process of accomplishing a task. But that's not as difficult an issue as people have made it to be.

Why do you think your viewpoint on this diverges so drastically from Geoffrey Hinton and Yoshua Bengio?

Geoff believes LLMs are smarter than I believe they are, and he's a little more optimistic about how they might get us to human-level AI. So he realized, "We need to worry about superintelligent machines. If you have a more intelligent entity, it is going to want to take over the world." I think that's just wrong. There's no correlation between being intelligent and wanting to take over. Even within the human species, it's not the most intelligent among us who want to be the leaders. In fact, it's quite the opposite, mostly. —*Andrew R. Chow*

These profiles have been condensed and edited for clarity; excerpt from TIME, *Sept. 7, 2023*

To combat bias in AI, training data must come from diverse groups—and humans doing the training should also be diverse.

'AI DOESN'T CARE ABOUT TRUTH, IT CARES ABOUT THE PATTERNS IT'S FED. IF THOSE PATTERNS ARE FAULTY, THEY'LL BE REPRODUCED.'

—Damien P. Williams

Bias in the System

AIs, like people, can absorb prejudices and exacerbate problems instead of solving them. In this Q&A, Damien P. Williams, an expert on social justice, explains the issues and what we can do to push back.

You're hiring an assistant or considering candidates for a grant, and you'd like to make the best choice possible, free of emotion or any hidden bias you might have—so you turn to AI for help. But not so fast! Generative AI, trained on the massive flow of human language and culture across the internet, has already absorbed our biases, including the unconscious ones. And while developers are working to purge racism, sexism, and disdain for the disabled from their language models, they have a lot of work ahead, especially when it comes to more nuanced forms of discrimination we cannot always perceive. In the Q&A that follows, Pamela Weintraub discusses the entrenched biases still laced through emerging AI with Damien Patrick Williams, a data scientist and philosopher at the University of North Carolina at Charlotte. His particular focus: How AI and algorithms affect the lived experiences of marginalized people, and how we can set things right.

Why do we find bias in AI?

We think that artificial intelligence systems are just math and just code, so they shouldn't have bias. But they are actually translations of the world, as we see it, into something a computer can understand. When we train systems, we make choices about what data we choose, how we organize that data, and what instructions we give to the systems about how to parse that data. And all of those choices have the hallmarks of human values and human perspectives in them, including bias.

You've said that the original AI systems were trained on biased data. Can you explain?

One of the largest sources of natural language processing data for the forerunners of large language models like ChatGPT came from the Enron Corporation. We call it the Enron Corpus. We're talking more than 600,000 emails, millions of lines of human natural language conversation, encompassing everything from shareholder discussions to how to handle a particular client to jokes. Some of it is pretty off-color and contains comments about ethnicity and gender. And all of that becomes the basis for teaching the language models to associate one word and one concept with another.

Given how biased the Enron data was, didn't they start over to develop today's systems?

Not entirely. But also, it's not just the Enron Corpus — conversation in general uses language that has bias and prejudice built right in. And generative AI is still trained on things like Twitter [now X], or Facebook, email exchanges, where biases are present.

How are today's creators trying to get rid of that bias on the back end?

They highlight things that are grossly prejudicial for exclusion but oftentimes, it's not until after they've seen a problem. Then they make the attempt to do a reinforcement learning process where they go in and they say we're not going to allow it to say these bigoted, harmful things.

What about steering these systems away from the ingrained, often unconscious bias, known as implicit bias, or the systemic bias we may not even see operating around us?
Systemic and implicit bias are more subtle things. These biases pervade us daily, and it's harder to observe them. If you work in an office, for instance, people may be more likely to ask a male co-worker for help—even if the female co-worker is more skilled. They'd be like, "Yeah, Sharon's, great. I love how she does her work." But day to day, these people are going to Mark, not Sharon, for help. Eventually, that implicit bias informs the entire system.

How does AI absorb implicit bias?
Let's say you are part of an IT team fixing a company's computers and the algorithm looks to which member has the highest success rate—but one is always called upon over another—that report can be read into the algorithm and impact the system as a whole.

That's scary. What's the real-world impact in terms of gender bias?
Communicating with Google Bard, I asked for specific words associated with the following phrases: president, teacher, nurse, doctor, secretary, CEO, associated with male, female, man, woman, he, she. What the system did was build a statistically likely recreation of what something like that would be, based on what it's trained on. And in that statistically likely recreation, the weighting for secretary, nurse, and teacher toward female or woman was 65% to 85%. And it was unlikely at all to find president as gendered female. And that's because these things are trained on language and scenarios in history that are pointing to the past, and then trying to use those things to predict and talk about the present and the future.

And what about racial biases in the system?
Digital imaging systems have long had problems with darker skin tones, and many facial recognition systems are trained on publicly available images such as mug shot databases. Black men are overrepresented in those datasets due to known disparities and prejudices in human policing. The systems relying on them can't distinguish between different Black men, will target any given Black man for criminal suspicion more often, and so more often misidentify and falsely accuse Black men as

Working Out the Kinks

Generative AI poses risks, from producing false, misleading or inaccurate content to privacy concerns. Here, some things to watch out for:

DEEPFAKES In March 2023, an AI-generated image of Pope Francis wearing a Balenciaga puffer jacket went viral online. Although deepfakes had gone viral before, none fooled so many people so fast. As the power of AI advances, it will only get harder to discern whether an image or video is real or fake.

A.I. IMAGE

VOICE CLONES In April 2023, a producer released "Heart on My Sleeve," a song featuring AI voices modeled on Drake and The Weeknd. Outrage ensued, but it's easier than ever to train an AI model with someone's voice. Experts predict voice clones will launch unprecedented financial fraud and elder abuse, requiring complex new authentication systems to protect us all.

HALLUCINATIONS Generative AI quite literally hallucinates, meaning it makes things up—pulls so-called "facts" and realities out of thin air, regardless of the truth. Tools like ChatGPT have been shown to return nonexistent articles as citations for their claims, give nonsensical medical advice, and make up false details about individuals. Damien P. Williams points to an AI-written mushroom foraging guide, sold on Amazon, that was inaccurately labelled and "could have led to someone dying."

INVASION OF PRIVACY It's important to protect your personal information when using these new tools which often require you to provide access to your data. Check out the app's privacy policies, control your settings and watch what you share.

If we build new technologies with social justice in mind and correct for bias quickly, we will have a chance to build a better, more equitable world for everyone.

suspects of crimes. Also, automated resume sorting systems are trained on human decisions made by people who often have implicit biases against names they consider "Black-sounding," a trait they associate with "unprofessionalism." This affects not only who gets hired but who gets promoted to positions of authority in which they could make real change.

You've focused on disability rights. What's the problem there?

There are many automated disability benefits systems in the United States. You can just plop your information into an algorithm and you'll get a determination as to how much money you get. When I ask generative AI for guidance on these payments, it replicates the legacy systems, with a bias against home or in-community care for disabled people and a preference toward institutional or hospital care; with either system, you'll get less money if you are cared for at home rather than at a facility. What these systems fail to understand is that, for people providing the care at home, that becomes their job. So while the algorithms assume there is another source of income for people at home, in reality often no other financial support exists. The reasoning for these decisions can be opaque.

Are you suggesting that if the current legacy system were transferred to AI, the inequity would become even more entrenched and harder to reverse?

That's unfortunately a very real possibility. You need a person, not a machine, to make the change. And if you're the group that's driving this kind of reinforcement learning process for AI, and you don't recognize ableist harm as a kind of harm, then you're not going to be able to push against it.

How can we untangle all of this?

One problem I have with the "AI Pause" some have suggested is that it does not look back. So many people have said, "Okay, let's not build anything stronger than GPT-4 right now because we don't know what it will do and it seems like it might get out of hand very quickly." But none of that is about disentangling the current problems in those systems. If a pause were to happen, it would need to be to reassess what prejudices and inequalities are already baked into the systems we're using now. If we don't or can't stop and fix these problems, we may have to untangle them by junking the current systems and starting anew. Either way, the process must be both thorough, and fast.

AI REGULATION TAKES BABY STEPS

At a closed-door meeting between most of the U.S. Senate and the country's top tech leaders in September 2023, Senate Majority Leader Chuck Schumer tried to start simple. "I asked everyone in the room, 'Is government needed to play a role in regulating AI?'" he told reporters. "And every single person raised their hands."

The forum on regulating artificial intelligence was meant to set the tone for collaboration between the world's biggest tech companies and Congress as it seeks to pass bipartisan AI legislation sometime in 2024.

Legislators put forward a series of proposals for everything from an independent federal office to oversee AI to liability for civil rights and privacy violations and a ban on deceptive AI-generated content in elections.

Any AI legislation will have to address problems including the environmental costs of training large models, and concerns over privacy, surveillance, medical applications, national security, and misinformation.

On Oct. 30, 2023, President Joe Biden signed a comprehensive executive order to safeguard against threats by AI but acknowledged that "we still need Congress to act."—*Vera Bergengruen; updated excerpt from* TIME, *Sept. 14, 2023*

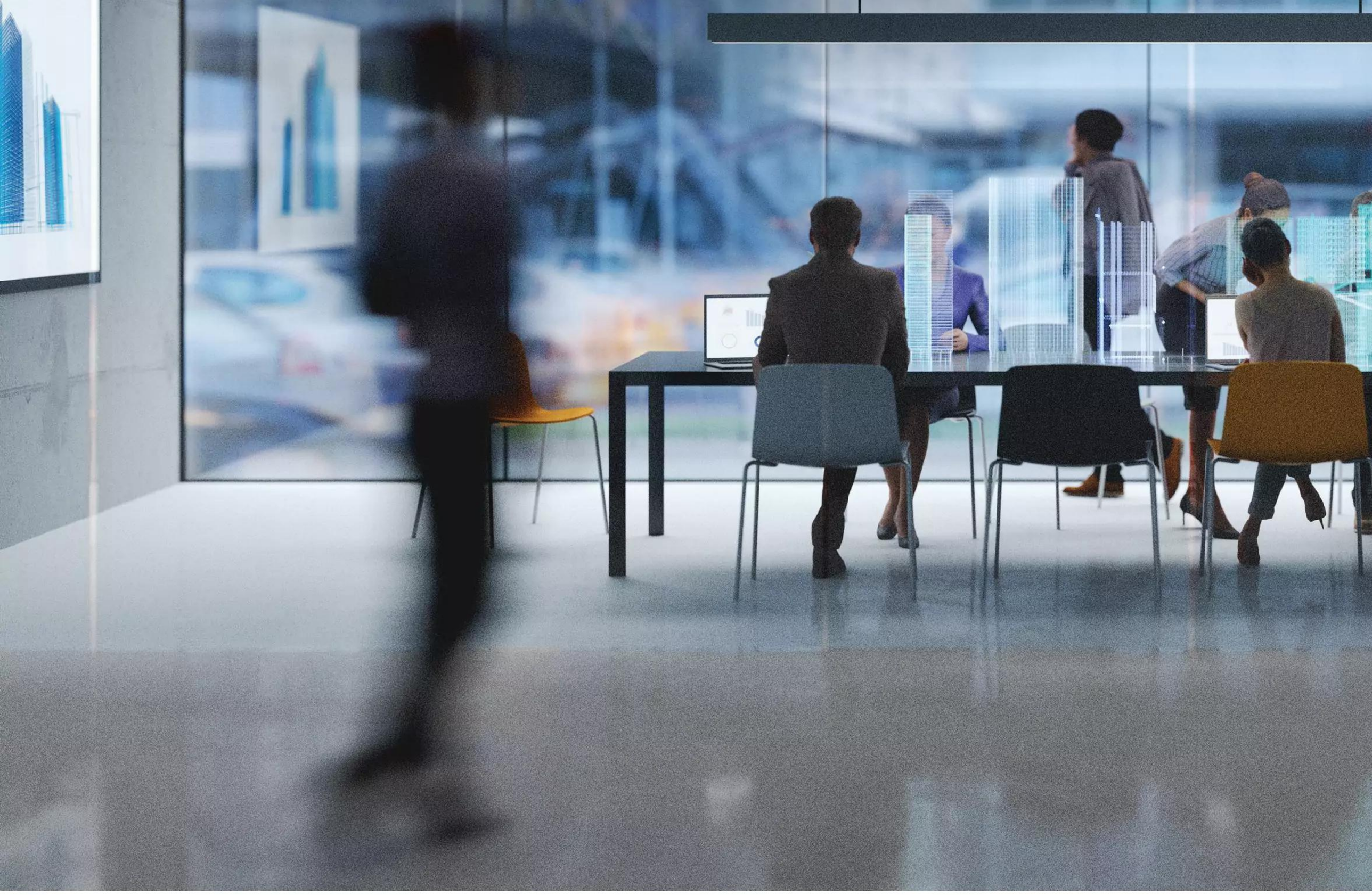
[SECTION 2]

THE NEW ORDER

From moviemaking to medicine and education, expect AI to significantly change your workaday world.

How to Make AI Work for You, at Work

You can feel threatened by AI, or you can harness its power to make some tasks easier so you have more time for creativity, networking, and mastering a brave new world. BY SIMMONE SHAH



Less than a year after many generative AI tools debuted, one-third of McKinsey's survey respondents say their organizations are using them regularly for work.

Before last year, Jana Soldicic's understanding of artificial intelligence was mostly limited to what she'd read on the pages of science fiction novels. But in the fall, after getting the chance to use the technology in real life as she played around with the generative AI tools ChatGPT and DALL·E , she got more curious.

"I really wanted to know what was behind it. I knew it couldn't be magic," Soldicic said.

She searched on her computer and found Elements of AI, a self-paced, online course created by MinnaLearn and the University of Helsinki that provides an introduction to artificial intelligence designed for people without a background in technology. Soldicic was surprised by how much she enjoyed the course.

"I got a little bit addicted to it," she says. "It gave me a basic understanding of what AI is now and what it could be."

The experience gave her a deeper understanding of how artificial intelligence actually operated—far beyond what she might have learned from messing around with the publicly available programs. Now, she's bringing that knowledge to her work as an event planner. "I now have more of an understanding what it could do for me, my work, [and] my colleagues, other than just creating texts or pictures."

Soldicic, who is based in Hamburg, Germany, uses AI text-to-image generators like DALL·E to bring ads and flyers to life with designs that it might have previously been impossible for her to create on her own. "We wanted little squirrels on a tandem bike for one event [flyer], and you could never find such a picture in real life. I put in 'two squirrels on the tandem bike' [on DALL·E] and there were so

many different and cool results. I didn't have to find somebody to realize my idea, I could just do it at home."

Artificial intelligence is expected to drastically change the way most of us work, but it's a shift many are unprepared for. Amid all the chatter around AI, there is increasing concern about the threat it may pose to workers, ranging from marketing executives and software developers to lawyers. A recent Goldman Sachs report found that as many as 300 million jobs around the world could be affected by AI and automation, but a Boston Consulting Group survey found that adoption has so far been largely limited to the C-suite. According to the June 2023 survey, 80% of executives said they used generative AI regularly, while only 20% of frontline employees reported the same. Meanwhile, a study earlier in 2023 by human resources analytics firm Revelio Labs found that the jobs most threatened by AI are largely held by women.

In the face of this change, people like Soldicic are trying to skill up in AI and bring what they learn to the workplace—and many courses are emerging to help them do it.

"It's clear this is one of those moments where people are really trying to get a handle on what's happening," says Dan Brodnitz, Global Head of Content Strategy at LinkedIn Learning. "This is about the opportunity for AI to improve our jobs and to augment our professional lives. To navigate that, people are going to and already [are] super motivated to invest in themselves."

WHAT THE FUTURE HOLDS

Experts say AI will likely transform the workplace, though it is developing so rapidly that we may not know all the ways it could change how we'll be working in the future. A recent survey by McKinsey estimated that generative AI tools could theoretically automate work that takes as much as 70% of an employee's time and that AI could replace half of workers' daily work activities by 2045—around a decade earlier than their previous estimates.

Unlike prior cycles of technological disruption, the shift stands to most impact knowledge-based workers, those in jobs that have traditionally had higher wages and educational requirements, according to McKinsey. (For more on how it's affecting these workers, turn to page 52.) However, experts say the shift will likely mean people will be required to use tools such as generative AI in the same way we use search engines and word processors. "These tools can enable workers to carry out a broader range of tasks and make people more effective," David Autor, a labor economist at the Massachusetts Institute of Technology (MIT), tells TIME. In fact, a 2023 study from MIT found that using ChatGPT boosted productivity for workers who had to complete assignments like writing cover letters or delicate emails. Access to the assistive chatbot cut the time it took to perform these tasks by 40%, while output quality rose by 18%.

> **'KNOWLEDGE WORKERS FACE THE HIGHEST LEVEL OF EXPOSURE HERE, WHICH IS QUITE DIFFERENT WITH WHAT WE'VE SEEN WITH OTHER REVOLUTIONS.'**
>
> **—Svenja Guddell, Indeed's chief economist**

"AI is not just about automating jobs and replacing people," adds Erik Brynjolfsson, senior fellow at the Stanford Institute for Human-Centered AI. By far the biggest benefits are having AI work with humans and help them be more productive."

Brynjolfsson, along with researchers Danielle Li and Lindsey Raymond, authored a study in which generative AI was used by over 5,000 customer support agents at a call center, and found that AI tools boosted workers' productivity, reduced attrition, and were especially helpful for early-career workers.

Through machine learning, the generative AI systems were able to use pattern recognition to identify successes and failures in customer service approaches. "It listened in on a whole bunch of transcripts and calls, and could see the patterns that turned out well, the ones that didn't turn out well," says Brynjolfsson. "It captured that tacit knowledge and passed it on to the less experienced workers."

Brynjolfsson said the AI system was able to recommend specific features to solve a customer's problems, or a tone of voice or phrasing that might work better. "Maybe no human had ever written down those rules before but the AI system, by looking at literally millions of transcripts, was able to pick up on these patterns."

AI tools are likely going to impact tasks that are "routine, predictable, or standardized," according to Tomas Chamorro-Premuzic, a professor of business psychology and author of *I, Human: AI, Automation, and the Quest to Reclaim What Makes Us Unique*. Though it might be tempting to brush off the sudden rise of AI tools as just a fad, Chamorro-Premuzic says it's important to become as familiar as possible with the tools, as they are likely to become ubiquitous. "These are tools that everybody will use, and if you're the only person not even trying it out or not using it, you might actually suffer," he says, comparing

AI Jobs You Can Get Right Now

The demand for workers with AI skills has exploded. There were 800,000 AI-related job openings in the U.S. last year, according to Stanford University's Institute for Human-Centered Artificial Intelligence. The Bureau of Labor Statistics projects employment in the fields of tech and engineering will grow by 21% between 2021 to 2031. But there are even high-paying jobs for workers without computer engineering degrees. For example, AI prompt engineers can earn six-figure salaries by developing clear text prompts so that the system delivers more accurate responses to questions. Here, some other opportunities.

California, Texas, and New York have the most AI job postings.

AI engineers use artificial intelligence and machine learning to tailor systems that make business recommendations and also enable organizations to become more efficient and productive.
AVERAGE SALARY $141,692*

AI research scientists investigate new AI techniques, explore ways to improve existing AI systems, and develop new algorithms to solve complex problems.
AVERAGE SALARY $103,626*

Machine learning engineers maintain and improve existing AI systems.
AVERAGE SALARY $151,399*

Data engineers build systems that collect, manage and crunch raw data that is then converted into usable information to help businesses maximize performance.
AVERAGE SALARY $117,964*

Robotic engineers develop robotics for such industries as automotive, defense, aerospace, architecture, manufacturing, and medicine.
AVERAGE SALARY $104,062*

Data scientists determine what questions organizations need to answer and develop predictive models to forecast outcomes.
AVERAGE SALARY $144,078*

AI business consultants help organizations to integrate artificial intelligence and machine learning technologies into their operations.
AVERAGE SALARY $137,885*

AI sales professionals promote and sell AI products and services that increase efficiency and revenue generation.
AVERAGE SALARY $124,194*

AI ethicists ensure that human bias hasn't been introduced into AI systems and develop guidelines for fair practices in the field.
AVERAGE SALARY 121,841**

—Linda Marsa

**Estimated total pay in the U.S., by Glassdoor*
***Salary from ZipRecruiter*

such resistance to deciding not to use Google's search engine. "Nearly all jobs will experience some exposure to AI," Svenja Guddell, Indeed's chief economist, confirms. "Humans are still essential. You need us around to get a lot of this stuff done. But tools like ChatGPT can be helpful in performing some job skills," she tells TIME.

Employers have taken note. A 2023 report from the career site Resume Builder found that 90% of hiring leaders consider ChatGPT proficiency to be a resume enhancer across a host of career categories. "When employers know that an employee or an applicant has experience with AI, that could potentially be more appealing to them, even if they're not a tech company," says Amber Clayton, senior director of Knowledge Center operations at the Society for Human Resource Management. "I think many employers are looking at this right now as an opportunity to be more efficient."

TRAINING UP ON AI

Ville Valtonen, MinnaLearn's CEO and co-founder, believes truly understanding AI is only possible by going back to the basics. MinnaLearn's Elements of AI course teaches students the patterns and probabilities that make artificial intelligence what it is, so they have the confidence to adapt alongside the technology. "The AI field moves so fast. There are hundreds of tools coming daily. So we think it's really useful that people learn the high level things first, and then they can apply that in the world. That's something you can use for much longer than a specific tool," Valtonen says.

The course is free and requires no advanced math or programming experience. "We wanted to create a course for that 99% of people who can't code and still wanted to understand how AI was being used in the world around them," says Valtonen. More than 1 million people from 170 countries have already signed up to take MinnaLearn's online Elements of AI course. The company also offers a paid version of the program tailored toward businesses and it launched a new chapter on generative AI this summer.

There are also more tailored courses for workers and job seekers looking to learn specific skills. Learners looking to understand the tools that might prove useful in particular roles or sectors could turn to LinkedIn Learning—LinkedIn's educational arm—for example. It offers more than 100 courses covering artificial intelligence, on both the theoretical and practical fronts. These range from "Introduction to Prompt Engineering for Generative AI" to "Artificial Intelligence for Business Leaders." Pricing for an individual LinkedIn Learning subscription begins at $19.99 per month, with the option to pay for individual courses.

> **'WHEN THERE'S A DISRUPTIVE TECHNOLOGY LIKE THIS, OVERALL IT'S GOOD FOR THE ECONOMY. EFFICIENCIES IMPROVE AND MORE JOBS ARE CREATED.'**
>
> **—Michael Fry, director of the Center for Business Analytics at the University of Cincinnati**

The courses are broken down into bite-sized chapters, many of which come in at under five minutes. "We've designed it so you can use the time you have available to learn what you need to learn," Brodnitz says. "It's all designed to give people a lot of control." Alphabet offers a range of courses through the Google Cloud Skills Boost platform.

Many universities also provide online classes in the new technologies. The University of Pennsylvania, for example, offers "AI Fundamentals for Non-Data Scientists" for $99. Harvard's popular "Introduction to Artificial Intelligence with Python" course is free and taught by professor David Malan, a renowned computer scientist. Platforms like Coursera and edX have even more classes that offer certifications in AI.

Art Munin decided to take some courses on AI after his employer, a tech company that helps colleges and universities with enrollment management, began deploying an AI tool of its own. "After learning about our AI tool, I was not satisfied just trusting that it worked. I wanted to know how it worked," he explained to TIME in an email.

Munin has taken several LinkedIn Learning courses, including "Deep Learning: Getting Started" and "Applied Machine Learning: Foundations." As conversations around artificial intelligence and its use begin to enter public conversation, he says the course has allowed him to better discern fact from fiction when it comes to the impacts and concerns around AI. "There is a gigantic difference between AI being used in military missile defense, for example, and AI supporting the recruitment of college students. These courses have helped me with a language and knowledge base to navigate these complex conversations and advocate for the reasonable use of AI in my field of work."

HOW TO GET STARTED

While there has been some legitimate concern about AI coming for many of our jobs, there are ways

According to a recent CNBC survey, workers who rely on AI for their jobs have a Workforce Happiness Index of 78, seven points higher than among those who don't, and are likelier to have received salary increases that have outpaced inflation.

workers can use AI to help them improve at their jobs. Consider how AI systems might impact your specific field, and whether it can help make your workflow more efficient, suggests Amanda Johnstone, CEO of the technology research and development lab, Transhuman. For example, when trying to brainstorm creative lab experiments that meet specific educational standards, a teacher can ask ChatGPT to help, rather than generating ideas on their own, she says.

It can even be as simple as asking the tool to draft an email or social media post. "Try not to make it too technical," Johnstone says. "You can have AI create 50 social media posts for you. And then spend half a day timing them to post [rather than] the next three months, or you can have artificial intelligence draft the next 10 newsletters for you."

Johnstone advises against approaching the prompt like a Google search. Instead, be specific in how you prompt the tool. "When you're prompting AI or working with AI, you need to think, 'What do I really want the end result to be?'; Do I want it to create a newsletter for our target audience bringing in real-time data?' Think about the end outcome and reverse engineer," she says.

While you don't have to be a data scientist, artificial intelligence is built around data and everybody will be expected to have some comfort level with handling data. But Michael Fry, director of the Center for Business Analytics at the University of Cincinnati, thinks workers will master these skills quickly. "AI will soon become like calculators, simply tools we use without thinking," he tells TIME.

For those interested in experimenting with generative AI tools, experts say a great first step is simply to take the time to play around with them—especially while there are versions of platforms like ChatGPT, DALL·E and Bard that are free. "Have fun with it, test it in your own way, thinking about the problems that you might have," Chamorro-Premuzic says. "It's definitely trial and error."

For some learners, the benefits of using AI at work has been a pleasant surprise. Damian Wolfgram, a California-based product manager who took MinnaLearn's "Elements of AI" course, says that outsourcing more mundane tasks like agenda-setting or double-checking a draft's grammar has drastically increased his productivity. "I'm able to get 80% of whatever that task is done in just 20% of the time," he says. "I'm the benefactor of that, because it frees up my bandwidth to do other things."

The most important piece of advice for those navigating this whole new world? Don't get stressed out about the new technologies.

"Any task that has to do with data processing and anything that's routine, AI will excel at," Kelly Monahan, managing director of Upwork Research Institute tells TIME. "But AI and humans have different types of intelligence and different types of skills. Critical skills, strategic thinking, emotional intelligence and creativity simply can't be programmed. At its best, AI augments human potential—it's not a substitute."—*Additional reporting by Linda Marsa; updated excerpt from* TIME, *Aug. 9, 2023*

The Future of Medicine

Artificial intelligence is improving diagnoses, treatments, and paperwork—and changing the doctor-patient relationship for the better.

DOCTOR IN YOUR POCKET

Will chatbots replace your primary care physician? Not if patients have their way. A Pew Research survey reveals that few Americans want their doctors diagnosing disease or recommending treatments with the technology. And only 13% think AI would improve the patient-provider relationship, according to the February 2023 report. But Eric Topol, a practicing cardiologist at the Scripps Clinic and author of *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*, is optimistic that AI's large language models can transform medicine for the better—from automating administrative tasks that often take up the bulk of a practitioner's time to getting to the bottom of difficult diagnoses. In the Q&A that follows, Topol makes the case to Annabel Vered for his vision of AI as a force for restoring trust and empathy to the doctor-patient bond.

AI is already being used to record conversations between a doctor and their patient and then converting that into a clinical summary. Has that made a difference?

That's going on right now throughout many medical centers in the U.S. These notes are better than any notes that existed beforehand. And that's liberation from the keyboard, which is a big deal in medicine. That's exciting, because that is already saving hours of keyboard time per day for each clinician, doctors, and nurses. And eventually, that's going to be the norm of how the record of a visit and bedside round will be done. Why would you go through all this data entry stuff, which is why a lot of people are so disillusioned to be in medicine? It's improving efficiency and productivity.

What do these ambient conversations streamline?

All sorts of things. Instead of the doctor having to do the preauthorization to the insurance company, instead of having to type in prescriptions, or order the tests that the doctor wants, or to nudge the patient about their blood pressure—all that is done through that conversation. That's taking off.

Is ChatGPT also being used for diagnoses?

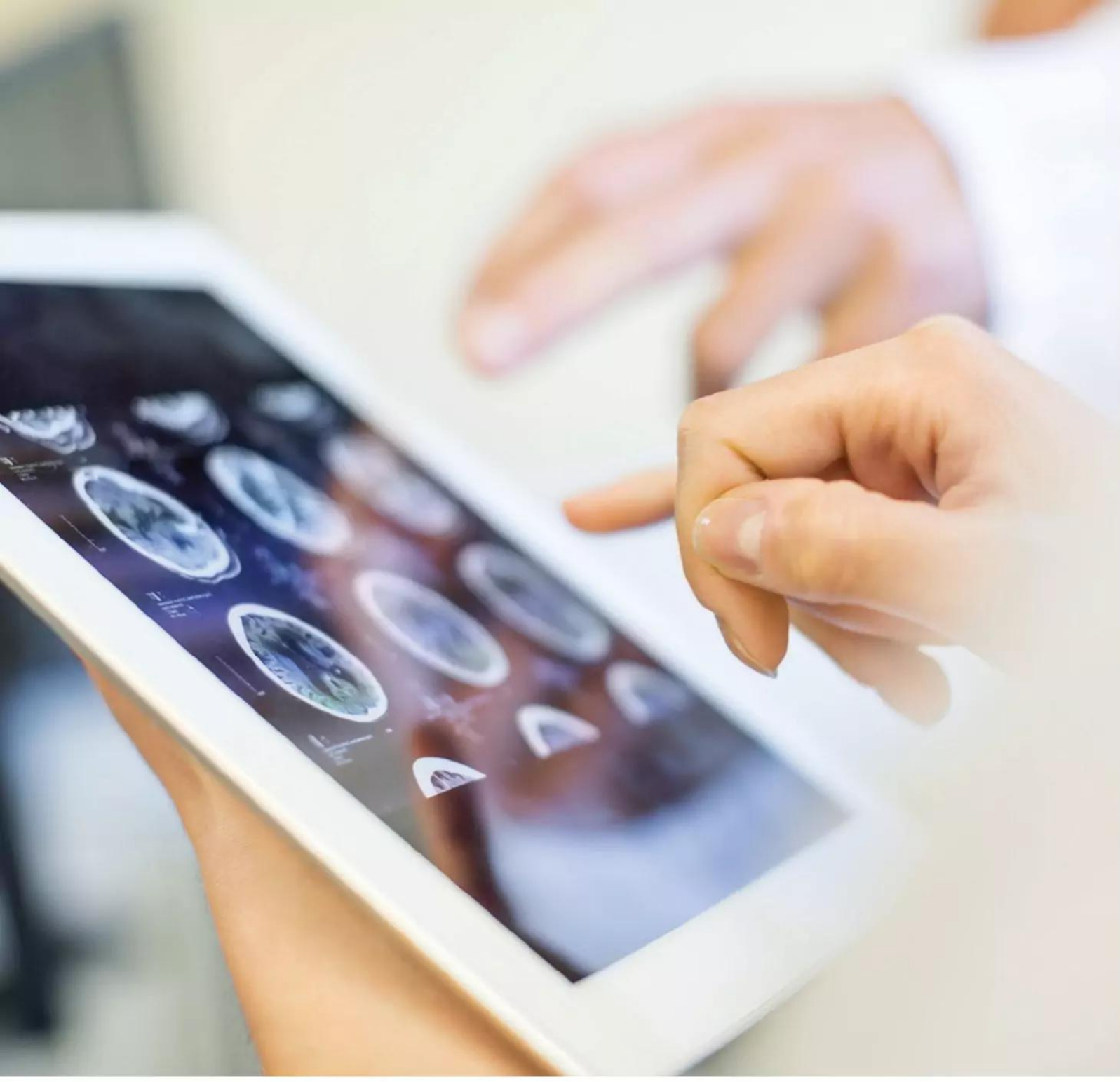
That's starting to get legs. People can't get appointments and want to get their medical questions answered, so they go to ChatGPT. And you've seen some anecdotes about incredibly complex cases, like the boy with the tethered cord syndrome. [ChatGPT diagnosed a 4-year-old with a disorder of the nervous system caused when tissue attaches itself to the spinal cord, after 17 doctors could not.] I have a patient who was told she had long COVID. She saw seven neurologists. Her sister put her symptoms into ChatGPT and [it said] she had limbic encephalitis, which is not long COVID. She got treated, and she's cured. That's where diagnosis is in the early stages.

Have you made a diagnosis with ChatGPT?

I used it for fun when I already had the diagnosis in several complex cases. I haven't seen it miss yet. I had a patient with mutation negative hypertrophic cardiomyopathy, and I put the symptoms [in GPT-4], and asked what's the diagnosis? And it got it right, so I said, that's pretty damn good.

Isn't that dangerous? What if ChatGPT gets it wrong?

People worry you're going to get mistaken hallucinations and confabulations. But that's kind of silly. Because while



"The advances will come fast," Eric Topol tells TIME. *"Just wait till we get to GPT-12!"*

that liability exists, what do we do now? We do Google searches, which are not very good, or go to WebMD. This is going to be a much more refined way of people getting answers to questions, by having conversations. And, yeah, there will be some mistakes, but you can get a second opinion, a third opinion, a fourth opinion—and it's all free!

Are you using AI in your practice?

Are you familiar with smartphone ultrasound [a small, handheld probe that allows doctors to see ultrasound scans on their phone]? Within seconds, I see everything in the heart. I show it to the patient and I can send the video to them when we're together.

Have you used that tool on yourself?

I had abdominal pain, I didn't know what it was, so I did an ultrasound of my abdomen and found out I had a dilated kidney. I went to the emergency room and I said to the doctor, "I did my ultrasound, I have pain, I have a dilated left kidney, I think I have kidney stones." He looked at me like I was an alien. They did a CAT scan and it showed exactly what I had on my phone—that I did have kidney stones. I tell the story to show what AI can do now. You don't have any experience with an ultrasound but you have a probe that you pop into the bottom of your smartphone and you say, "OK, I want to do an echocardiogram." You put it on the chest. And the AI talks and says, "You need to go lower, you need to go counterclockwise." As soon as it gets the image or the video loop, it analyzes it and interprets it.

Does the AI automatically send this data to your doc?

If you're healthy, it would only be between you and the AI. Let's say you have a high risk for asthma or heart disease: Your AI coaches you about what you can do to prevent problems, whether it's through diet, exercise, or another specific thing. Individualized medicine, virtual coaches, hospital at home, all sorts of things will be enabled. That's the next frontier.

What's a hospital at home?

That's going to happen, where we basically don't admit people in the hospital unless they're critically ill, because we have got sensors and all this data from a patient. It's like having an ICU in a patient's bedroom.

You feel strongly that AI will bring humanity back to medicine. Can you explain?

I'm confident of the potential, but there's one contingency. On the one hand, patients will be more autonomous, and on the other hand, physicians will have the gift of time to spend with patients who need it. Whoever listens to patients anymore? Because it's rush, rush, rush, and typically, the doctor is typing on a keyboard. We can't get worse. We can only get better from these various technological advances.

So what's the catch?

The catch is that in the U.S., doctors are beholden to overlords, who are financial bean counters. Their goal is "see more patients, make more money." That can't be tolerated. Our opportunity to restore the humanity in medicine and bring back the patient-doctor relationship hinges upon understanding how that gift of time can be actualized, so each visit is not an average of seven minutes. I saw a really complex patient today, who had been to many medical centers, and I had one hour and 20 minutes with that patient. We have to get back to that intimate bond where the patient says, "This doctor has my back." I know it sounds counterintuitive —how can technology enhance humanity?—but I firmly believe if we do it right, we can get there.

HEALTH CARE FOR EVERYBODY

In another life, John Halamka worked as an emergency physician, becoming the nation's top expert on poisonous mushrooms and plants. "I still see 900 patients a year," he tells TIME. "Within two to three minutes, I can tell you, based on a picture of what the patient ate, what treatment they need."

Can artificial intelligence fill in here? "Not really," Halamka says. It turns out an AI is not so accurate when you're looking at pieces of mushrooms. But it could bring the right patients to him, instead of letting them sit in a clinic misidentified and misdiagnosed. "What AI is good at is saying there are a million patients, and here are the 100 that this doctor should see."

Now, as president of the Mayo Clinic Platform, a collaborative network of shared global patient data, he aims to use AI to allow every provider to practice at "the top of their license" and distribute precision medicine to billions of people around the world. The project is wildly ambitious, ultimately intended to aggregate expert and human data from the world's major medical centers and the most remote regions on Earth, filter it through specialist AI algorithms, and then dispense care back out to patients everywhere.

To build its platform, the Mayo Clinic made the decision, starting in January 2020, to take data from 10 million patients, "protect and deidentify" it, as Halamka says, and use it to train algorithms across the medical specialties from neurology to cardiology to oncology and more. But those records were insufficient for the global medical intelligence the project needs. (The 40-year-old woman in Sapporo had a different story than the 90-year-old man in Stockholm than the teen boy outside of Lagos.)

So Halamka kept reaching out, adding on partners around the world. He started with Mercy Hospital in St. Louis, bringing in another 15 million patients; then he reached agreements with Brazil's Hospital Israelita Albert Einstein, Israel's Sheba Medical Center, and Canada's University Health Network, encompassing three continents and a total of 30 million global patients. Yet that too is just a start. In 55 flights taking Halamka through Europe and Asia from October through December 2023, he plans on bringing in many millions more. (As this issue goes to press, negotiations are underway.) "Mayo's role is to be the catalyst that's democratizing this technology to all. Can we touch 4 billion people with these algorithms?" he aks.

DEMOCRATIZING PATIENT DATA

The tech being built in the current collaboration stands in stark contrast to generative AIs trained on the whole internet, hundreds of thousands of books, Wikipedia, emails, tweets, and more—the essence of human culture, science, and creativity which also happens to generate bias and make mistakes. Instead, to diagnose with certainty and manage patients efficiently, such systems are being trained on expert medical knowledge and patient records only—and then managed inside dedicated specialty systems impenetrable to the rest of the outside world.

Collaboration may be global, but every medical AI will have to operate in accordance with local laws and regulations.

When analyzed by AI, this massive amount of data reveals more than human experts can ever see. Indeed, Halamka himself is the second person ever to be sequenced by the Human Genome Project. Yet genes are just one risk factor for disease. "I think of data as having three characteristics: the depth, [as in] how much you know about an individual and their birth to death health care experience; where they live; and how they live," Halamka states. "It's every aspect of who they are, their genome, the care they've received, the diagnoses they've had.

"What if I live near a smokestack spewing this or that environmental contaminant?" he asks. The hope is that instead of seeing the doctor when I already have disease, through the use of sensors in my home and the data around me, AI is able to continuously look at my health and detect disease, and enable that early intervention that will reduce my pain, or my consequences and my expense."

So far, his team has been building out algorithms for about 100 medical specialties (184 are planned), each encased in a system of its own. At places like the Mayo Clinic, much of the capacity is already there. In oncology, one application involves the colonoscopy. "Do you know that the best-trained colonoscopy specialist misses about 15% of the very tiny polyps on endoscopy?" he says. "Whereas Mayo's AI misses about 3%. AI makes a human five times better in detecting what may be an early risk."

In cardiology, AI sees patterns humans cannot. For instance, Halamka has a supraventricular tachycardia, which means his heart rate sometimes goes from 50 to 170, a very irritating state of affairs. But does he have cardiovascular disease? Pulmonary hypertension? Anything the matter with his valves? AI has given Halamka a clean bill of health, "and you're starting to see that cardiology as a field will move from late-stage diagnosis in bricks-and-mortar facilities with a clinician in front of you, to a continuous remote AI-informed way of looking at your heart function," he tells TIME.

As for the rest of the world, challenges for adapting such systems vary, depending on where you are. In Northern India, where every family has excellent cell phone service, connection should be easy. Just attach connectors to record EKGs (to measure heart rate), pulse, and sleep to cell phones, and that can be submitted to an AI. "Whether it's the patient or a community health worker, it's easy enough to deploy." In sub-Saharan Africa, the challenge is more difficult because the bandwidth is costly and slow. "And so you start to deploy the algorithms by placing them on phones," he says. For instance, through computer vision, scans could be conducted and fed back into the larger network for a read.

With so much medicine filtering down through AI to every person on Earth, what role remains for the doctor on the ground? You would still go to a clinician for "your care journey," Halamka explains. But every rural practitioner can now have specialists at their fingertips by having AI review the case.

That review will just be another data point: We are not turning human decisions over to machines. Consider Halamka's wife, an artist diagnosed with stage-three breast cancer. Without access to an AI to just shoot out data for him back in the day, Halamka went and searched the literature himself. It turned out that for a Korean woman, then age 50, with estrogen-positive, progesterone-positive, HER2-negative disease, slightly less chemo could still give a cure with far less risk of numbness in feet and hands, which would have disrupted her painting career. Today she has achieved a cure, and still can paint. "These are the kinds of decisions that AI can help us make," he says. "The decision would remain with us."—*Pamela Weintraub*

Can Chatbots Replace Therapists?

From Earkick to Woebot, there are chatbots to support mental wellness. Describe a problem and they can answer with what feels like empathy, offering suggestions or follow-up questions—and with a pretty good rate of success, according to research. But can AI truly duplicate the experience of talking to a human therapist—and should it? "The ultimate question is whether a treatment works," says David Tolin, an adjunct professor of psychiatry at Yale University School of Medicine. "If it does, then we're happy. [But] there is something I would find a little sad if we eventually replaced the human connection with a computer connection."—*By Jamie Ducharme; excerpt from* TIME, *Oct. 4, 2023*

AI in the Classroom

Can the new technology promote critical thinking without sacrificing the human touch?

BY OLIVIA B. WAXMAN

Peter Paccone, a social studies teacher in San Marino, Calif., has a new teacher's aid helping him in the classroom this year. He plans to defer to his helper to explain some simpler topics to his class of high schoolers, like the technical aspects of how a cotton gin worked, in order to free up time for him to discuss more analytical concepts, like the effects of the first industrial revolution.

His new assistant? ChatGPT.

"What I feel that I don't have to do any longer is cover all the content," Paccone told a group of more than 40 educators in a May 2023 Zoom workshop, which he organized. If artificial intelligence is on the cusp of reshaping entire aspects of our society—from health care to warfare—the first realm that leaps to many minds is education: Asked a question online, the ChatGPT chatbot will produce an answer that reads like an essay. Indeed, both students and teachers are grappling with AI's implications for learning, homework, and integrity. Paccone is only one of many high school teachers who has been experimenting with ChatGPT in the classroom. But the tool is inspiring as much trepidation among educators as it is excitement.

In early 2023, some of the nation's largest school districts, from New York City to Los Angeles, banned access to ChatGPT in the classroom, citing "concerns about negative impacts on student learning, and concerns regarding the safety and accuracy of content" while they worked to formulate policies around it. Meanwhile, teachers desperate to figure out how to harness the tech for good congregated in Facebook groups like "chatGPT for teachers" (about 374,000 members) and "The AI Classroom" (more than 29,000 members).

"The majority of the teachers are panicked because they see [ChatGPT] as a cheating tool, a tool for kids to plagiarize," says Rachael Rankin, a high school principal in Newton Falls, outside of Youngstown, Ohio.

But Paccone and a growing group of educators believe it's too late—and a bad idea—to keep AI out of their classrooms. Randi Weingarten, President of the American Federation of Teachers, a major teachers union, believes the panic about AI is not unlike the ones caused by the internet and graphing calculators when they were first introduced, arguing ChatGPT "is to English and to writing like the

ChatGPT has added a layer of excitement to the classroom for now. Is the tech transformative, or just the flavor of the moment? Teachers are on the fence.

calculator is to math." In this view, there are two options facing teachers: show their students how to use ChatGPT in a responsible way, or expect the students to abuse it.

MATH RAPS AND SHAKESPEARE TRANSLATION

As teachers wrestle with whether to use AI in their classrooms, they're also learning about the pernicious ways that abuse can take place.

At another Zoom teacher training workshop that TIME observed in July 2023, hosted by Garnet Valley School District in Garnet Valley, Penn., education consultant A.J. Juliani ran through various AI apps that students are using to cut corners in class. Photomath lets students upload a picture of a math problem and get detailed instructions on how to solve it. Tome can turn notes into a narrative, perfect for essay writing and preparing for presentations. And Readwise can highlight key parts of PDFs so that students can get through readings faster.

"Many of them are just using it to do the work because they're bored," Juliani said. "They're not engaged. They don't care. And we have to own up to that."

Many of the more than a dozen teachers TIME interviewed for this story argue that the way to get kids to care is to proactively use ChatGPT in the classroom. A July 2023 Walton Family Foundation survey found 73% of teacher respondents had heard of ChatGPT, and 33% used it to "help with planning lessons" and 30% to come up with "creative ideas for classes."

Some of those creative ideas are already in effect at Peninsula High School in Gig Harbor, about an hour from Seattle. In Erin Rossing's precalculus class, a student got ChatGPT to generate a rap about vectors and trigonometry in the style of Kanye West, while geometry students used the program to write mathematical proofs in the style of raps, which they performed in a classroom competition. In Kara Beloate's English-Language Arts class, she allowed students reading Shakespeare's *Othello* to use ChatGPT to translate lines into modern English to help them understand the text, so that they could spend class time discussing the plot and themes.

Teachers are also using ChatGPT to generate materials for students at different reading levels. Aileen Wallace, who teaches a class on current events in Falkirk, Scotland, said the tool could instantly produce simplified versions of readings on the causes of terrorism for 14-year-olds who either read at lower reading levels than the rest of the class or have been learning English as a second language.

To be sure, ChatGPT doesn't always get things right—but teachers are finding that provides its own way to engage students. Some are having students fact-check essays generated by the program in response to their prompts, hoping to simultaneously test students' knowledge of the topic and show them the problems with relying on AI to do nuanced work.

In Panama, International Baccalaureate teacher Anna May Drake had juniors and seniors critique a ChatGPT-generated essay comparing George Orwell's *1984* and Margaret Atwood's *The Handmaid's Tale*, while in the Detroit area, Sarah Millard, a ninth-grade honors English teacher, had students critique a ChatGPT-generated essay on Shakespeare's *Romeo and Juliet*. "My students have never been so engaged in writing," Millard says. "They wanted to beat the computer" and were "tearing apart" the AI-generated essay.

Teachers are even finding that ChatGPT is a big time-saver for their own homework. Larry Ferlazzo, who teaches English, Social Studies, and International Baccalaureate classes in Sacramento, calls it a "miracle" and has had ChatGPT help write college recommendation letters for some of his students. He says it did it "10 times better" than he would have alone.

Debate Partner & French Friend

Generative AI has been making inroads across the grade levels and subject matters. Among some innovative uses, look to:

LANGUAGE LITERACY

■ **Storytelling** Educator and author of *The AI Infused Classroom* Holly Clark developed an exercise for students of her second grade class to pick elements for a story, from conflicts to main characters, and then feed them to ChatGPT, *EdWeek* reports. "You are a children's book author," Clark instructed them to prompt the AI. "…write a very short story for an audience of second graders, using these elements."

■ **French, Anyone?** Sean Michael Morris, vice president of academics at Course Hero, says ChatGPT is great for learning a foreign language at any grade level. "I can take a sentence, such as 'How are you today' in French," he tells TIME, and it "responds and I have to read that in French."

■ **Writing** Peter Stone, a computer scientist at the University of Texas at Austin, uses the chatbot to help non-native English speakers improve their written expression. He asks his students to submit both their original work and a polished version produced as output from generative AI. "They are required to both do their own original thinking and improve their clarity of expression," he tells TIME.

CRITICAL THINKING

■ **Skeptical Mindset** Eamon Marchant, science department chair at Whitney High School in Cerritos, Calif., is alerting students to bias and other fundamental flaws, like hallucinations, generated by the tech. The problems "do not scale away," he tells

'THERE'S A TIDAL WAVE COMING'

While many educators agree that a ban on ChatGPT in the classroom is not the answer, they differ on how much it will change schools. Some think it will be a revolution. "There's a tidal wave coming for education," says Dan Fitzpatrick, an author and keynote speaker on AI in education and administrator of "The AI Classroom" Facebook group. "Our schools could really find themselves irrelevant in the next few months to a few years."

Others believe it may become a useful tool, but the basics of schooling won't change. "I've lived through probably nine hype cycles of AI and education where visionaries proclaim that this is the big breakthrough—and then it isn't," says Chris Dede, a Senior Research Fellow at Harvard Graduate School of Education who is an expert on the history of educational technologies. "Generative AI is certainly not, in my opinion, some kind of enormous breakthrough that's going to transform education."

There are real concerns about ceding too much instruction to the program: Weingarten and others fear it will promote educational inequities, further dividing classrooms into students whose families have the resources to afford the high-speed internet connection that eases access to ChatGPT and students whose families do not. There are also worries about biases in the data AI uses to craft its answers to users' prompts.

"Much of the information that's online, that ChatGPT is trained on, is going to be predominantly of western perspective, and what's going to be less represented are the perspectives, knowledge, and experiences of underrepresented communities," says Ezekiel Dixon-Román, Director of the Edmund W. Gordon Institute for Urban and Minority Education and Professor at Teachers College, Columbia University.

And it will be no small challenge for teachers to figure out how to use the technology to develop students' critical thinking skills without sacrificing the connections that can be the product of human-to-human teaching—an even more urgent challenge when it comes to students who mentally checked out during the pandemic. When it comes to getting knowledge to stick, there may be no substitute for human relationships. To many teachers, that's reason enough not to fear the extent of the disruption on the horizon.

"I've been to former students' weddings and baby showers and funerals of their parents," says Millard, the high school English teacher in Michigan. "I've hugged my students. I've high-fived my students. I've cried with my students. A computer will never do that. Ever, ever."—*Updated excerpt from* TIME, *Aug. 8, 2023*

TIME. He wants his students to know what AI excels at, and what is best left to more traditional means.

■ **Art of Collaboration** John Camp, who teaches ninth through 12th grade humanities at New England Innovation Academy in Marlborough, Mass., likes to see teamwork and enjoys a mix of perspectives. That's why his classes use Google's Bard, he tells TIME, to "review three versions of Bard's response to the prompt." Morris adds that students can use it to research potential thesis statements for an essay on *Hamlet*, for example, and then compare them: "It's not writing the essay for them, it's helping direct them."

■ **Debate Coach** The tech makes a solid debate prep partner by modelling what a competitor might say and strengthening students' counterarguments.

GIVING EDUCATORS A HAND

■ **Gaining Perspective** "One of the interesting uses I've seen is teachers just going into ChatGPT and asking, 'What is the best way to teach this?'" says Morris. Elizabeth Delaney, who teaches engineering at NYC's Basis Independent Schools, uses generative AI to "expand my knowledge as an educator or introduce new ideas. You give it a lot of information and it can give you a lot of ideas, but not all of them will be good!"

■ **Planning Lessons** Nneka McGee, chief academic officer for the San Benito Consolidated Independent School District in San Benito, Texas, tells TIME she enjoys generating images and slide decks with the AI software Curipod, which allows her to draw on interest hooks, bullet points, and questions, all in service of building a lesson plan.

■ **Grading Tests** Jennifer Turner, an algebra teacher in New Jersey, saves hours when the app Bakpax grades her students' tests, she tells the *New York Times*. She pays those hours forward with more time for the students, helping them see the true beauty of math. —*Alexandra Frost*

A Hollywood Remake

Generative AI is much more than just special effects, and it's causing a new explosion of innovation in Tinseltown. BY SUSAN HORNIK

Artificial intelligence has been enhancing visual effects, editing, and postproduction in Hollywood movies for decades. Remember when the dinosaurs attacked in *Jurassic Park* in 1993? Brad Pitt de-aging in *The Curious Case of Benjamin Butto*n in 2008? All due to AI.

"In many ways, AI is a phrase summing up a collection of technologies Hollywood has been using for years to make filmmaking and TV production easier," Eric Deggans, TV critic at National Public Radio, explains to TIME. More recently, the team assembling the 2016 *Star Wars* movie, *Rogue One*, used computer-generated imagery (CGI) to recreate Peter Cushing, who died in 1994. A few years later, other filmmakers resurrected the late Carrie Fisher for her role as Leia in 2019's *The Rise of Skywalker*. And with more computing power and sophisticated programs, AI-based systems were able to take images of a young Harrison Ford from the first *Indiana Jones* movies and superimpose them over the actor's 80-something body for a long flashback sequence to open 2023's *Indiana Jones and the Dial of Destiny*.

But in the last year, AI has become one of the most controversial topics for just about everyone who works in Hollywood, from TV and film actors to writers and cinematographers. Worried that the technology would put their livelihoods in jeopardy, the Writers Guild of America (WGA) and the Screen Actors Guild-American Federation of Television and Radio Artists (SAG-AFTRA) became relentless disrupters, going on months-long strikes to bring forth regulation on the use of AI in creative projects.

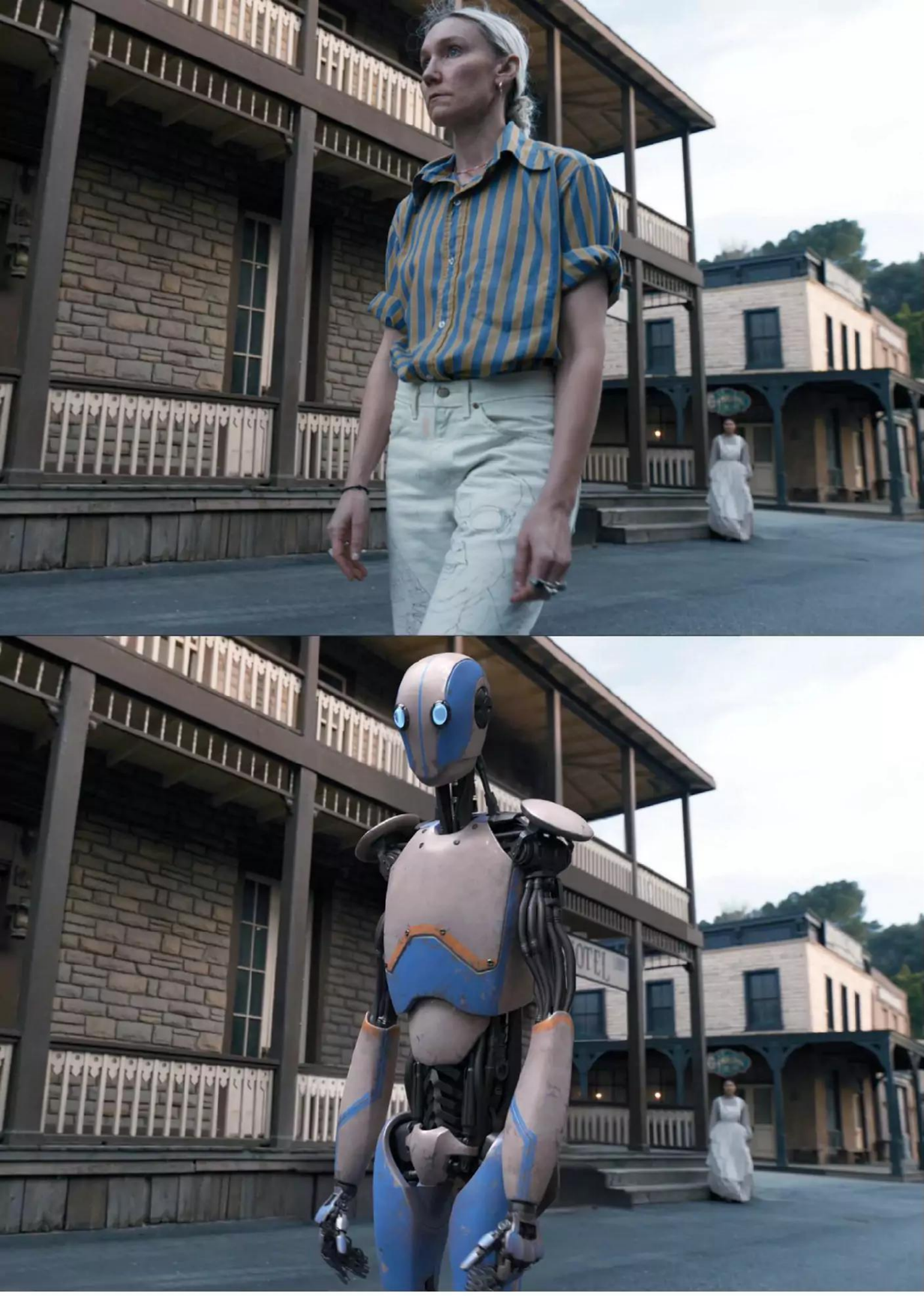
Hollywood executives have been forced to listen. After resolving their strike, the WGA implemented new AI restrictions, immensely appeasing the writers who feared they could be replaced by text-based generative AI tools like ChatGPT. [Talks between SAG-AFTRA and the studios were ongoing at press time.] "WGA members are truly feeling a sense of relief," Hollywood screenwriter Michelle Amor tells TIME. "The idea that Hollywood thought we would agree to entire movies and/or TV series being generated by AI, with minimal, if any, human involvement was infuriating and terrifying, making the win that much more victorious."

Yet Emmy-winning producer/AI expert Neil Mandt questions how writers will feel three years from now, when their next contract negotiations begin—after they find they have "benefited greatly using these tools" themselves, he tells TIME. "Everyone will have the benefit of the rearview mirror. The real discussions are still yet to come."

Some are convinced things will go badly if any guardrails come down. Actor-writer-director John Pollono, whose next film is the Jennifer Coolidge and Dustin Hoffman crime comedy *Riff Raff,* is against any technological breakthrough that makes it harder to tell a story. He describes AI-generated images as "nightmarish hallucinations" because there is no human soul behind them. Giving that kind of aesthetic freedom to an AI "terrifies me," he tells TIME, and "I'm worried that laziness will trump common sense."

FAKE TOM CRUISE

Is the worry misplaced? Maybe not. "Hollywood 2.0 is all about AI right now. This is like the internet in the 1990s. We are in gold rush days," says Mandy Stadtmiller, author of Ignore Previous Directions, a top-read Substack on AI and founder of YouGotThis.AI, which teaches AI skills to creatives. "Even with the end of the writers strike, we are on pace for about 90% of content to become purely AI



Wonder Dynamics is a startup that creates AI tools that allow filmmakers to instantly replace footage of a real person, top, with that of a CGI character.

generated," with first adopters seeing the most gains. "Look at the creators of *South Park*. They've received $20 million for their studio [Deep Voodoo] that produces deepfakes—and have already showed it off with a Kendrick Lamar video where AI morphs his face into other celebrities."

That's the same tech the new AI software company Metaphysic used to create a deepfake Tom Cruise in 2021 and a deepfake Simon Cowell, where the judge appeared to sing on *America's Got Talent*. Describing Metaphysic as an early winner in "the Wild Wild West" that is AI, Stadtmiller noted the company has raised $7.5 million and is the sole provider for the new Robert Zemeckis drama, *Here*, in which Tom Hanks, Robin Wright, and other cast members are de-aged for an adaptation of Richard McGuire's graphic novel, which is set in a single room over the course of many years.

They are also working with celebrities to help them claim ownership over their digital AI twins. Yet losers abound: Background actors report feeling pressured to agree to digital scans for a measly day's pay only to have studios use their likeness in perpetuity.

New forms of creativity and painful disruptions lie ahead. Travis Cloyd, CEO and founder of immersive media agency WorldwideXR, tells TIME he sees AI as offering "substantial benefits permeating every stage of filmmaking, from predictive analytics to help studios identify potential box-office hits, to virtual actors and AI-generated experiences. It's about seizing the opportunities it presents, making our work easier, and delivering better entertainment experiences."

WorldwideXR is currently producing *Back to Eden*, a sci-fi film that resurrects icon James Dean, who died in a car crash at the age of 24 in 1955. The transformative tech, Cloyd adds, can also generate realistic storms, fantastical creatures, breathtaking space scenes, and historically accurate settings. The company is also exploring immersive AI opportunities with the estates of deceased Hollywood stars like Rock Hudson, Bette Davis, Natalie Wood, Will Rogers, Clark Gable, and more.

Josh Welsh, president of Film Independent, a nonprofit that has helped filmmakers launch their projects, fears what comes next. "It's fantastic to see that the new WGA contract stipulates that AI-generated material can't be used to undermine a writer's credit, and AI cannot write or rewrite literary material. This is a huge win for the writers and the creative community more broadly," he says. But Welsh suspects the first application of AI is "not about telling better stories or making better movies. It's simply to find ways to pay writers and actors, and all creative people, less."

The future is still anyone's guess. "AI certainly isn't going away, and hopefully, and probably, it will have some wonderful applications that we can't even imagine right now," he adds. "But the fact is no one, including the people who are creating AI, know where it is headed."

New Tools in the Newsroom

Artificial intelligence is rapidly transforming journalism, from how reporters do their jobs to the ways in which the news is being consumed. BY AMOS ZEEBERG

In 2021, a 13-year-old signed up for a TikTok account and searched for "onlyfans," the name of a site known for hosting adult entertainment. The user soon fell down a rabbit hole of sexual content, much of it labeled "adults only." At one point, videos about bondage and sex made up more than 90% of the user's feed. But this 13-year-old was not a real person—it was one of more than 100 automated accounts, or bots, created by investigators at the *Wall Street Journal* to test how TikTok algorithms could draw many of the youngest users down a pathway of exposure to inappropriate content. Louise Story, the paper's former chief product and technology officer, tells TIME that the *Journal's* computational journalism team used a variety of AI tools for projects like the TikTok investigation.

AI is rapidly changing the nature of the news we consume, with different technologies having a huge range of applications for journalists. Already they're using it to do new kinds of reporting, reach more users, and pull meaning out of big data. As publishers adopt AI in new ways, it should help journalists do their work faster and smarter—or, if used less wisely, it may degrade the news and sideline the people and organizations that are dedicated to providing it.

Le Monde, a leading French newspaper, used AI to create a new avenue for getting its work out. In 2022, the paper launched an English edition, with articles translated from the original French version. The traditional way to do this work, hiring expert translators, would be far too slow and costly; using a garden-variety translation app like Google Translate would be cheap and quick but wouldn't produce writing up to *Le Monde*'s standards. So the paper chose a middle path. It first sends its French copy through DeepL, an automated translation app. Then the text is buffed up by two layers of human editors, retaining the brand's panache while churning out about 40 articles per day. "If there were only the seven journalists currently working on the project writing stories, we would publish maybe one to five" a day, *Le Monde*'s English editor Elvire Camus told *Nieman Reports*.

Some journalists are using AI on a more individual basis, as a personal assistant, to brainstorm ideas, test headlines, and more. The *New York Times'* Farhad Manjoo describes ChatGPT as a "jetpack" to help him find the right words, summarize long documents, and break through writing blocks: "Sooner rather than later," he wrote, "something like ChatGPT will become a regular part of many journalists' tool kits."

Of course, not everyone agrees. The greatest fear is that generative AI will mass-produce a journalism-like product that replaces the artisanal variety, or at least sucks up much of the industry's profits. Media mogul Barry Diller is hoping to form a coalition with other publishers to negotiate with tech companies over use of their content. The IAC chairman says that large language models, trained partially on text from news websites, could snatch the value of that content away from publishers by repackaging the information for their own users. "You saw over the last, certainly, 15 of those years, the enormous destruction" caused by giving away news for free online, he said in May 2023. Unless there is a structure in place for publishers to get paid, he added, "you will see another wave [that is] even more destructive."

Indeed, Google is testing a tool code-named Genesis that can generate news articles from raw information, like the details of current events. The company is pitching it to newspapers as an aid to help reporters take care of routine tasks, but surely some owners will see this as a way to trim what they're spending on staff. It's already happening. In

Google's Jenn Crider insists that the company's AI tools "cannot replace the essential role journalists have in reporting, creating, and fact-checking their articles."

April 2023, BuzzFeed laid off 15% of its workforce after it shut down BuzzFeed News; the company is now "leaning into" more AI-created content, like quizzes and chatbots. Two months later, German newspaper *Bild* announced that it would lay off one-third of its employees due to automation.

Various publishers have begun dabbling in AI-generated news, and so far, the results raise more concerns about automated journalism burying us in junk rather than beating us on quality. CNET provoked a backlash after it began publishing AI-written articles in November 2022 without notifying readers or even staffers. Some articles contained errors; CNET's editorial employees unionized, alarmed that "automated technology threatens our jobs and reputations."

In June 2023, an executive at newspaper publisher Gannett said that it was a mistake for other news services to use generative AI to quickly throw up cheap content and that "we're not making that mistake." Yet in August, the *Columbus Dispatch* posted a soccer recap without team names: "The Worthington Christian [[WINNING_TEAM_MASCOT]] defeated the Westerville North [[LOSING_TEAM_MASCOT]]," reported the Gannett paper. Sam Guzik, an expert on journalism and tech at New York Public Radio, tells TIME that if this goes on, people might be forced to "buy their way out of the internet of garbage."

It might not come to that. For every glaring coding error, there's a bloom of inventive efforts to use AI to provide better journalism. SourceScout is a tool that helps reporters quickly find diverse experts to interview—a "ChatGPT plugin to amplify marginalized genius," co-creator Alicia Stewart tells TIME. Spanish publication *Newtral* fights misinformation with ClaimHunter, a language model that scans through news for potential falsehoods, which are then fact-checked by people. Reporters use AI to transcribe their interviews (for example, with Otter.ai), and publishers use it to show users content that suits their preferences.

Journalists and publishers face challenges but also opportunities with AI. Now they have to show the computers—and their audiences—just how intelligent humans can be.

AI helps architects create sustainable buildings by incorporating features like rainwater harvesting or intelligent lighting to plans.

Rethinking the Thinking Jobs

Is AI coming for knowledge workers? Yes, but not in the way we think. BY PAYAL DHAR

Knowledge workers will be the ones most disrupted by the boom in artificial intelligence, according to a June 2023 report from McKinsey & Company. It's most likely to transform the jobs of higher-wage workers "because of advances in the technical automation potential of their activities, which were previously considered to be relatively immune from automation," the consulting firm finds. Workers who have earned a master's degree or doctorate could see 57% of their tasks automated through generative AI and for those with a bachelor's degree the number is even higher, at 60%, McKinsey projects.

So are knowledge workers—including bankers, lawyers, engineers, architects, research scientists and more—really set for a wave of pink slips, like factory workers of generations past? Not so fast. The report notes, "The biggest impact…that we can state with certainty is that generative AI is likely to significantly change their mix of work activities." It already has.

FINANCE AND BANKING

Citibank has been using AI for years: to gain insights into customer behavior and preferences; to manage portfolios and lower risks; to automate data entry. But when it came to generative AI, the bank originally drew the line, restricting use of ChatGPT (along with Goldman Sachs, J.P. Morgan and others) early in 2023. Now, that has changed. "Overall, the risks of not embracing generative AI far outweigh the risks of engaging with it," Citi CEO Jane Fraser wrote on LinkedIn in July 2023. In the near term, generative AI will drastically improve productivity. Over the long term, it could "revolutionize all functions across our bank and the industry—changing how we write code, onboard clients, service customers…and strengthen compliance and controls." Other banks are putting their toes in the water as well. J.P. Morgan has announced it will use large language models to detect fraud by analyzing emails. And Ally Bank, in partnership with Microsoft, has created Ally.ai, connecting ChatGPT-3.5 with the bank's data, security, and other internal operations—"unleashing productivity and new efficiencies," chief information, data and digital officer, Sathish Muthukrishnan, says.

LAW

It made headlines early this summer when two attorneys were fined $5,000 for submitting a legal brief full of fictitious cases and citations prepared by ChatGPT. Chatbots not only make stuff up, they are also rife with privacy concerns, and the legal profession is vulnerable to risk.

The good news is that while one law firm erred, the profession as a whole has been constructing potent AI tools with the guardrails lawyers need. Of course, the legal profession has long used specialized databases like LexisNexis and Thomson Reuters to sift through information and research case law, and those companies are leaning in. LexisNexis has been integrating machine learning and AI capabilities into its search for years. Now, with the advent of generative AI, the company will be using its proprietary database to train a specialized large language model without fear it will serve up fake citations. And Thomson Reuters has just acquired Casetext's CoCounsel, an AI legal assistant powered by a proprietary and specialized version of OpenAI's GPT-4 (the platform has

passed both the multiple-choice and written portions of the Uniform Bar Examination). CoCounsel is capable of doing the job of a legal assistant, from creating a deposition outline, to writing a detailed legal research memo, to extracting important information from a contract, including clauses that aren't compliant with policies or laws. Clearly, the tech offers unprecedented efficiencies to the field. "Law is a castle built on language," Pablo Arredondo, co-founder of Casetext told Law.com. And "finally now, after 80 years of pursuing the ability to have computers that can understand and interpret and really work with language, reliable deployment of generational advances in [AI] technology" have given us the ability to do exactly that.

ENGINEERING

For decades, engineers have used versions of proprietary AI to control robots; manage production on the factory floor, including identifying patterns to improve efficiency; upgrade transportation routes and oversee the deployment of goods; and so much more. Applications are multifarious, so it's no surprise that specialized generative AI systems are making waves: From Autodesk to Siemens to Dassault Systèmes, companies now use internal platforms to optimize design; BMW uses industry-specific generative AI to reduce weight and maintain stability of their vehicles; Boeing is employing it to create new designs for wings and fuselages. Inside companies like Microsoft, chatbots have been deployed to share technical information and give engineers access to data upon request. When it comes to generative apps making inroads in software design, Microsoft senior AI engineer Sakshi Mishra says the apps could ultimately revolutionize the prototyping and manufacturing phases of projects, minimize iterations and streamline "the transition from concept to physical realization." But the user needs to beware as the systems are still prone to errors.

ARCHITECTURE

Neil Leach, a design professor at Florida International University and author of *Architecture in the Age of Artificial Intelligence*, calls AI "a form of 'prosthesis', extending and augmenting the abilities of the architect." Already, AI-based applications are helping with time-consuming processes like manual drafting, creating 3D models, site planning, conceptualizing interiors, and so on, leaving architects with more time for the creative aspect of their work—to design better buildings. According to Wanyu He, based in Shenzhen, China, and CEO of the AI architecture software XKool, a single architect using her app can achieve as much as five architects. Interviewed in *The Guardian*, Leach said the most revolutionary change would be "automation of the entire design package, from developing initial options right through to construction." Other architects, meanwhile, have called for caution, noting that as with all generative AI, the rule of garbage in, garbage out still holds—and more research would be needed to make sure buildings created this way could withstand the test of time.

'AS A HUMAN BEING, YOUR SUPERPOWER IS CREATIVITY—YOU GET NEW IDEAS ALL THE TIME. YOUR SUPERPOWER IS NOT DATA-CRUNCHING. THAT'S THE JOB OF AI.'

—Sakshi Mishra, Microsoft senior AI engineer

SCIENTIFIC R&D

At DeepMind, an AI system called AlphaFold can predict the 3D structure of a protein based on its amino acid sequence, dramatically speeding drug discovery and treatments for disease. At the semiconductor giant Nvidia, researchers are building an AI system, named Earth-2, that predicts the next 14 days of weather tens of thousands of times faster and more accurately than today's meteorological systems. At Brookhaven National Laboratory, researchers are using AI to discover unique structures and self-assembling materials for clean energy and electronics. The list goes on. AI can analyze enormous quantities of data and recognize patterns not apparent to humans; develop hypotheses; and devise and simulate experiments ultimately performed over networks or by robots at massive scale. Relieved of the arduous scut work, scientists themselves will be set free. Writing in MIT's *Technology Review* in July 2023, Eric Schmidt, Google's former CEO, said he expects to see big things. "Previous paradigm shifts in science, like the emergence of the scientific process or big data, have been inwardly focused—making science more precise, accurate, and methodical. AI, meanwhile, is expansive, allowing us to combine information in novel ways and bring creativity and progress in the sciences to new heights."

SOFTWARE DEVELOPMENT

As far as Pete Herzog, a hacker and threat analyst who strives to improve digital security, is concerned, AI enhances his work. Tasks from password generation and authentication to threat detection

Generative AI-based weather prediction models, like Nvidia's FourCastNet, will hopefully improve forecasting, especially in the case of extreme weather events.

and prevention can be handled by AI more efficiently than humans, of course. And "every step that you take away from humans to make a security decision is going to make [a system] more secure. I see this across possibly thousands of tasks within an organization," he tells TIME.

But the kind of closed and dedicated software Herzog is talking about, routinely used by specific companies on specific tasks, is a far cry from the generative AI systems auguring changes to come. From GitHub Copilot, owned by Microsoft, to Amazon's CodeWhisperer, generative AI that writes code is already "making it so small startups like ours can accelerate all aspects of the software development life cycle. We're a team of five devs, and we estimate productivity impact of almost 2X," Diamond Bishop, CEO of Seattle-based Augmend, told GeekWire. Bigger companies are mostly holding back, for now. So even though Goldman Sachs says the technology could yield as much as a 40% productivity boost in software development, most big players are still in the development phase; they fear that putting their software into generative AI systems will compromise data ownership and privacy.

In short, despite all the advancements, AI is just one more inflection point we will embrace as we always have when disruptive technologies come our way. Through it all, knowledge workers will still be there. "Generative AI can be a complement to human ingenuity. It can help us become more productive by eliminating routine tasks and freeing us up to focus on higher-order work," Citi's Fraser says.

Evgeniya Fedoseeva, founder of Generation KM, a knowledge management company based in London, believes the next incarnation for the knowledge worker will involve human-machine teams—operating across dimensions of space and time. Freed from repetitive tasks, humans will function in virtual or augmented realities, collaborating creatively with other human-AI teams worldwide. The synergy of these teams could lead to true leaps of imagination. "Some tasks, which you spent a lot of time on, will be executed by machines, and then as a human being you can write, create, and strategize, because your brain is multidimensional," she tells TIME. And the world they will invent is anyone's guess.

The message is one that has endured for millennia, Herzog contends. "It isn't anything that parents haven't told their kids over the last 5,000 years: You always have to learn, there is no stopping it," he says. "It doesn't matter what the job is."

[SECTION 3]

THE TOOLS

For every hobby or passion, the latest AI apps—from ChatGPT to Midjourney and more—can offer a digital helping hand.

Sam Altman champions the possibilities of AI while urging policymakers to mitigate the dangers.

Like the *Star Trek* Holodeck

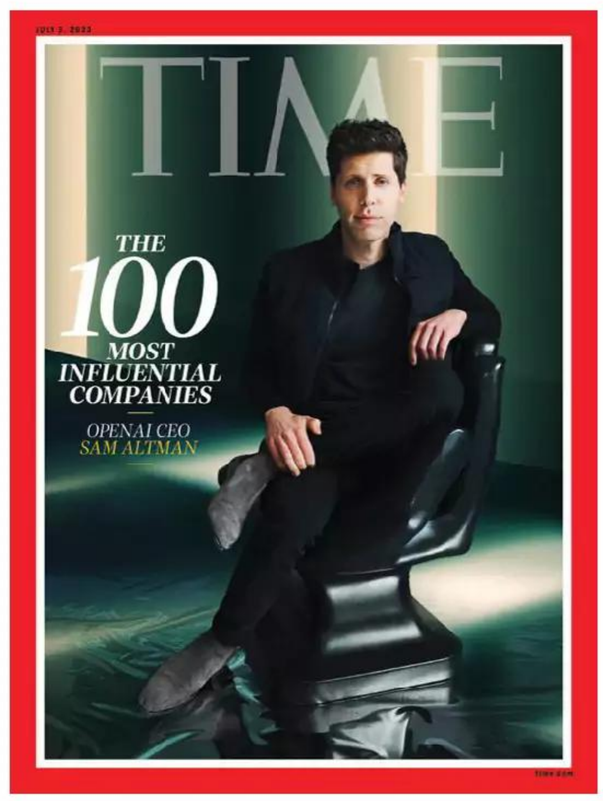
OpenAI CEO Sam Altman is pushing past doubts to imagine the future: voice, images, immersion and magic. BY EDWARD FELSENTHAL AND BILLY PERRIGO

"You ever watch *Star Trek*?" asks Sam Altman, the CEO who has become the most visible face of the current artificial-intelligence boom. The serial entrepreneur has lately become known for talking up the risks of AI, but he is at his most animated in talking about its possibilities. So transformative is this new technology that responds naturally to our verbal commands that he envisions new hardware for it—something, eventually, like the *Star Trek* holodeck, in which characters use their voice to conjure and interact with 3D simulations of the world. An interface like that feels "fundamentally right," he says.

Altman's company, OpenAI, is only eight years old. It has fewer than 500 employees. But in the span of six months, the company—through its viral product ChatGPT—has vaulted AI into public consciousness. Few doubt it's at the vanguard of a revolution that will, for better or worse and probably both, change the world.

ChatGPT, which was released in November 2022, is almost certainly the most rapidly adopted product in the history of technology. It's also one of the more versatile, capable of responding to a vast array of user prompts, from "Tell me a joke" to "Draft 10 slides with ideas to grow revenue at a hair salon." It can write poetry and explain scientific concepts.

Altman says he uses it for routine tasks, like pulling highlights from his overflowing email inbox or to "draft a tweet that I was having a hard time with." Essentially a superpowerful auto-complete tool trained to generate language by observing patterns in large quantities of data, it has its limits—including a disconcerting inability to separate truth from fiction. OpenAI's warning about this, placed beneath the text input box, hasn't stopped people from using it for homework, investment advice, and even therapy.



Altman sat down with TIME *for its 100 Most Influential Companies July 3, 2023, cover story.*

In the Q&A that follows, Edward Felsenthal, TIME's former editor in chief, asked Altman to discuss the world-changing technology. (*The conversations have been condensed and edited for clarity.*)

What do you use ChatGPT for?

I can't really keep up on my inbox anymore, but I made a little thing to help it summarize for me and pull out important stuff from unknown senders. I paste it in there every morning. I used it to translate an article for someone I'm meeting next week, to prepare for that. That was all today.

Were you surprised by the viral reaction to the launch?

Not as much as it might have seemed from the outside. We thought it was going to excite people, but the people we

spend a lot of time with in our bubble had already gotten pretty excited by the technology. And so in some sense it was like, "Wow, these numbers are going nuts. This is wild to watch." But I remember a lot of the discussion that first week was, why hadn't this happened before?

Other AIs already existed.
I think the user experience mattered a lot. It's not just the UI, it's the way we tuned the model to have a particular conversational style. It's very much inspired by texting. I was a huge early adopter and a super-user of text messaging.

What will the interface look like as the technology integrates more deeply into our lives?
You'll be able to talk like two people, and that'll be powerful. [OpenAI rolled out voice and image features for ChatGPT in September 2023.] The thing that will matter most is how much of the stuff you want to happen can happen from a relatively small amount of conversation. As these models get to know you better and are capable of more, you can really imagine a world where you have a fairly simple and short conversation with the model, and a huge amount of things get done on your behalf.

And is that through our phone or is it everywhere?
I think it's everywhere, all at once. Now people are still in the phase where they're saying, "I'm an AI company." But pretty soon we'll just expect all the products and services we use to have some intelligence baked in, and it'll just be expected like a mobile app is today.

You've described this technology as the greatest threat to the human existence and the greatest potential advancement for humanity.
Definitely one of the confusing parts of this technology is just the overall power—the good, the potential bad. We can do a lot to maximize the good and manage and mitigate the bad, but the scary part is just sort of putting this lever into the world will for sure have unpredictable consequences. The exciting parts are almost too long to list, but this is transforming the way people do their work. It's transforming the way people learn. It's going to transform the way people interact with the world. In a deep sense, AI is the technology that the world, that people have always wanted. Sci-fi has been talking about this for a very long time.

> **'WE CAN MANAGE THIS [AI], I AM CONFIDENT ABOUT THAT. BUT WE WON'T SUCCESSFULLY MANAGE IT IF WE'RE NOT EXTREMELY VIGILANT ABOUT THE RISKS.'**
> —Sam Altman

As a parent, one of the things that seems scary is, how do we know our kids are really our kids. You get a call, "I need money, I need help."
That's going to be a real problem soon. It's not just as parents, it's thinking about our own parents who are already disproportionately victims of these ransom phone calls. We just need to start telling people this is coming. You can't trust a voice you hear over the phone anymore.

Do I need a code word with my kid?
I think it'll be a stack of many solutions. People will use code words they'll verify over video. That'll work for a while. There will be technology solutions that help. People will exchange cryptographic keys and many other ideas too. We'll just need a combination of technical and social solutions to operate in a different way. I am worried, but we will adapt. We're good at this. We as a society.

You've spoken about a global body, that we need an oversight board the way we've looked at, for example, atomic energy.
I am deeply not an expert here. And also you should be skeptical of any company calling for its own regulation. But we are calling for something that would affect us the most. We're saying you've got to regulate the people at the frontier the most strongly. These systems are already quite powerful and will get tremendously more powerful. And we have come together as a global community before for very powerful technologies that pose substantial risks that one has to overcome in order to get to the tremendous upside.

Other specific proposals?
There are minor short-term things that I think hopefully are very noncontentious. I think all generated content should have to be tagged as generated. The fact that we can't even agree on this yet seems like a miss.

What can get done in the U.S.?
We can get short-term AI regulation done for sure. That example of let's identify all generated content as such. Let's require independent audits for these systems and safety standards they have to meet. I think that's doable. I'm somewhat optimistic that the longer-term coordination is doable too.

You've had an approach at OpenAI to bring a new product into the world early and let people engage

Some of the OpenAI team, from left: CTO Mira Murati, CEO Altman, president Greg Brockman, and chief scientist Ilya Sutskever.

with it rather than waiting until it's more fully formed. Is this "move fast and break things"?

No, but it is engage with the world, show people what's happening, what's going to happen, and get their input to build something that works for as much of society as well as possible. There is nothing like putting something out and then going to talk to people. That input from the world about what we're doing, what we should do, is super important.

As people begin to use AI in a hands-on way, what are they getting wrong?

One thing that people are getting wrong in the frame is, is this a tool or a creature? And even people who know it's a tool because it's sort of easy to anthropomorphize, get caught up in the over-creaturizing of it. And I think that's a mistake. And it leads to mistaken thinking. This is a tool. For people to take this seriously, really engage with it, understand it, it's not enough to tell them about it. You have to show people and people need to use the technology themselves, get a sense for it, the limits, the benefits, the risks. The conversation really needs to start now because it will take a while to figure this out, but every government is now paying serious attention.

What's coming in the near future?

There's a lot of stuff that'll come. We'll get images and audio and video in there at some point, and the models will get smarter. But the thing that I think people are really going to be happy about is right now if you tried something 10,000 times and took the best one out of 10,000 responses, it's pretty good for most questions, but not all the other ones.... GPT-4 has the knowledge most of the time, but you don't always get its best answer. And how can we get you the best answer all the time, almost all the time? If we can figure that out, and that's like an open research nut to crack, that'll be a big deal.

You've written about and talked about points where a slowdown might be warranted.

100%. If the models are improving in ways that we don't fully understand, that would be one. If there's significant societal disruption, that would be another. If we don't feel like we're making sufficient progress on alignment technology [aligned with human well-being] for the projected capabilities of the next train run, that would be a third.

What pressure do you feel from this explosion of investment in the space and startups everywhere you turn?

You're not going to believe me on this, but almost none at all. I've at least been consistent about saying this for years. This is just different than anything else. Society is going to fundamentally change. This is super different than who gets a little bit more or less market share. We've got to figure out how to manage this and have this go well.—*Updated excerpt from* TIME, *June 21, 2023*

A User's Guide

From ChatGPT to Midjourney and more, here's how to launch your own projects with generative AI. BY BRIANA BROWNELL

Imagine being able to craft a funny poem for your sister's birthday based on your mutual love of sweets, then including it in a card with an image of calico cats eating chocolate cake in space! Today, you can.

With incredibly simple and intuitive interfaces, large language models (LLMs) like ChatGPT and image generators like Midjourney and DALL·E 3 can create outputs that range from the useful to the extraordinary. It's a hallmark of human-machine synergy and collaboration that steers your creativity into uncharted—and exciting—territories you may not reach on your own.

These systems offer endless possibilities for innovation by responding to prompts quickly and comprehensively in a conversational, human-like way. They use deep neural networks to learn patterns from massive amounts of data—billions of words and images—that they are trained on. The models generate responses in real time by drawing on their learned patterns with an element of randomness. Because of this, minor changes in what you ask can lead to completely different responses, and may not always be accurate.

In the pages that follow, we'll teach you the art of the prompt for some of the most popular text-to-text models and text-to-image models. You'll start with the basics: from teasing out menus for dinner parties to planning a great getaway; from creating cool patterns to dreaming up fantastical landscapes. But once you learn to soothe AI into partnership and dig deep into its guts, coding entire video games, writing lyrics for a musical, or designing a cover for a magazine like this one could be next. So what are you waiting for? Turn the page—and dream big!

A.I. IMAGE

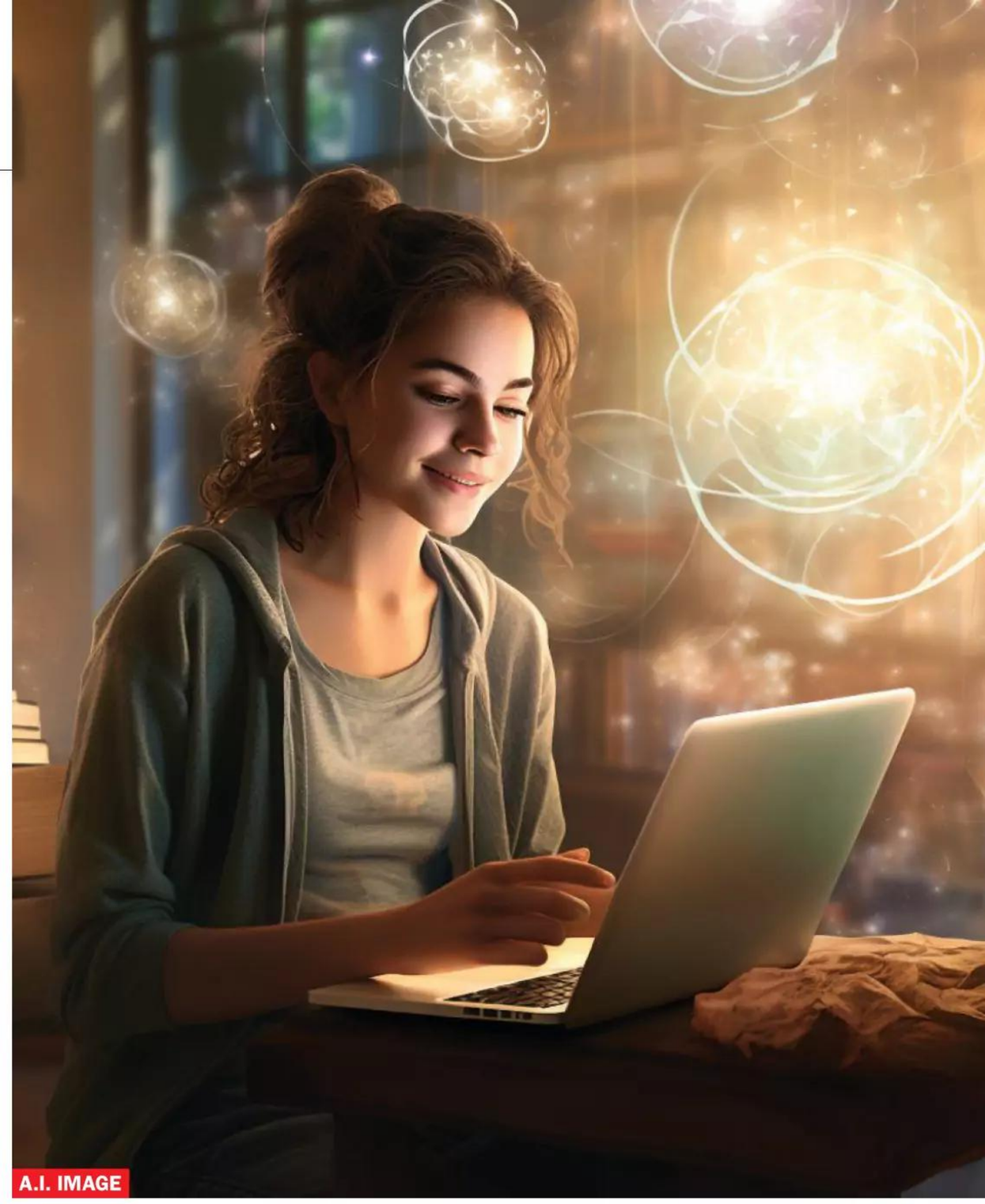
All images in this article were created by artificial intelligence, including the futuristic world seen here, which was generated by Midjourney.

GETTING STARTED WITH LARGE LANGUAGE MODELS

When engaging with a chatbot, the back-and-forth style of interaction you use to elicit information feels a lot like having a conversation with a friend. You dip into your brain for the words you want and type out your prompt. The chatbot dips into the LLM that powers it and pulls forth the tumble of words that best approximates what you seem to need.

Since each LLM is slightly different, "chatting" may vary from ChatGPT to Bard or Bing to Claude, for example—and the results will vary slightly, too. But most of the time, no matter what the app, prompting at its most basic level is like asking an assistant to do something. For example, if you prompt with the request, "Can you summarize this abstract and make it accessible to a 10th-grade reading level?," the LLM will provide a simplified summary. The most important thing you need to do? Have a clear idea of what you hope to accomplish.

To prompt along with us in this hands-on tutorial, just sign up for ChatGPT 3.5, OpenAI's free version (*chat.openai.com*).



The free version of ChatGPT is based on information up to September 2021. It won't have access to real-time information beyond that date.

HOW TO WRITE YOUR FIRST PROMPT

It's easy to get started. First, consider each of the following parts.

- What goal do you want to accomplish? This could be something like exploring an idea, drafting a document, or getting feedback for your work. Be specific.
- Is there contextual information that might be relevant to your request? If you were explaining what you needed to a colleague, what information would they need to know about?
- Are there any specific constraints that need to be taken into account?

Once you are ready to ask the chatbot your question, write it out in sentences and enter the text in the prompt text box at the bottom of the screen, where it says "Send a message." For the examples that follow, text in the blue bubble is the prompt, and the chatbot's responses are in italics.

What are some traditional Southern sides I can serve with ribs?

Traditional sides to serve with ribs can complement the rich, smoky flavors of the meat while offering a variety of textures and tastes. Here are some classic options:

***1 Coleslaw** Creamy or vinegar-based coleslaw provides a refreshing contrast to the richness of ribs.*
***2 Baked Beans** Sweet and savory baked beans are a staple at many BBQ gatherings.*
***3 Cornbread** Cornbread muffins or slices are a classic Southern side dish that pairs well with ribs...**

Remember that the choice of sides can vary by regional BBQ style and personal preference. Feel free to mix and match to create a delicious and well-rounded meal...

BACK-AND-FORTH PROMPTS

Sometimes, you'll want to tackle a more open-ended task. In these cases, you can go back and forth with the bot, taking turns responding to each other like a written conversation. The bot will usually include a mixture of general information, and then it will ask you questions to help it refine the answer to get closer to what you want. If you don't know the answer, say you aren't sure.

I want to go visit a national park. Which one should I go to?

The choice of which national park to visit depends on your interests, the time of year you plan to travel, and what kind of natural beauty and outdoor activities you prefer. Here are a few popular national parks in the United States, along with some of their unique features.

1 Yosemite National Park, California Known for its stunning waterfalls, granite cliffs (including El Capitan and Half Dome), and lush valleys, Yosemite is a haven for hikers, climbers, and photographers. It's a year-round destination, with beautiful spring blooms, summer hikes, and winter snowscapes.
*2 Yellowstone National Park, Wyoming/Montana/Idaho The first national park in the world, Yellowstone is famous for its geothermal wonders, including Old Faithful, colorful hot springs, and wildlife like bison and grizzly bears. It's best to visit in late spring through early fall...**

Remember to check each park's website for up-to-date information on park hours, entrance fees, and any seasonal closures or conditions. The best national park for you will depend on your interests and the kind of experience you're seeking, whether it's hiking, wildlife viewing, photography, or simply enjoying the beauty of nature.

My interest is seeing wildlife.

If your primary interest is seeing wildlife, there are several national parks in the United States that offer exceptional opportunities for wildlife viewing. Here are some national parks known for their diverse and abundant wildlife:

1 Yellowstone National Park, Wyoming/Montana/Idaho Yellowstone is famous for its diverse wildlife, including bison, elk, grizzly bears, wolves, and various bird species. Lamar Valley and Hayden Valley are popular spots for wildlife sightings.

*2 Grand Teton National Park, Wyoming Located near Yellowstone, Grand Teton National Park is home to a wide range of wildlife, including moose, elk, bison, grizzly bears, black bears, and bald eagles. The park's stunning landscapes provide a picturesque backdrop for wildlife photography...**

DIGGING DEEPER

Brainstorming and refining ideas is one of the best ways to use generative AI tools. Consider it an iterative process where, depending on the bot's outputs, you can take it in whatever direction you want. If you forget to add important criteria, you can narrow the request further.

Can you help me with some ideas for a birthday cake?

Certainly! Here are some creative and fun birthday cake ideas that you can consider for a special celebration:

1 Classic Layer Cake A classic layer cake with delicious flavors like vanilla, chocolate, or red velvet. You can decorate it with colorful buttercream frosting, sprinkles, and a personalized birthday message.
*2 Character Cake Create a cake that features the birthday person's favorite character from a movie, TV show, or book. Popular options include Disney characters, superheroes, and beloved animated figures...**

Remember to consider the birthday person's favorite flavors, colors, and interests when choosing a cake design. Personalizing the cake will make the celebration even more special.

It's for a child who is turning 10. Any good ideas for that?

Certainly! Here are some fun and creative birthday cake ideas that are perfect for a child turning 10:

1 Number 10 Cake Create a cake in the shape of the number "10." Decorate it with colorful icing, candies, and edible decorations that the child loves. You can also add their name or a birthday message.
*2 Superhero Cake Make a cake that celebrates your child's favorite superhero. You can create a cake in the shape of a superhero logo, or decorate it with edible images of superheroes in action...**

Remember to consider your child's interests and hobbies when choosing a cake design. They'll be thrilled with a cake that reflects their passions and makes their 10th birthday extra special.

A superhero cake sounds like a great idea. What other treats should I serve alongside that?

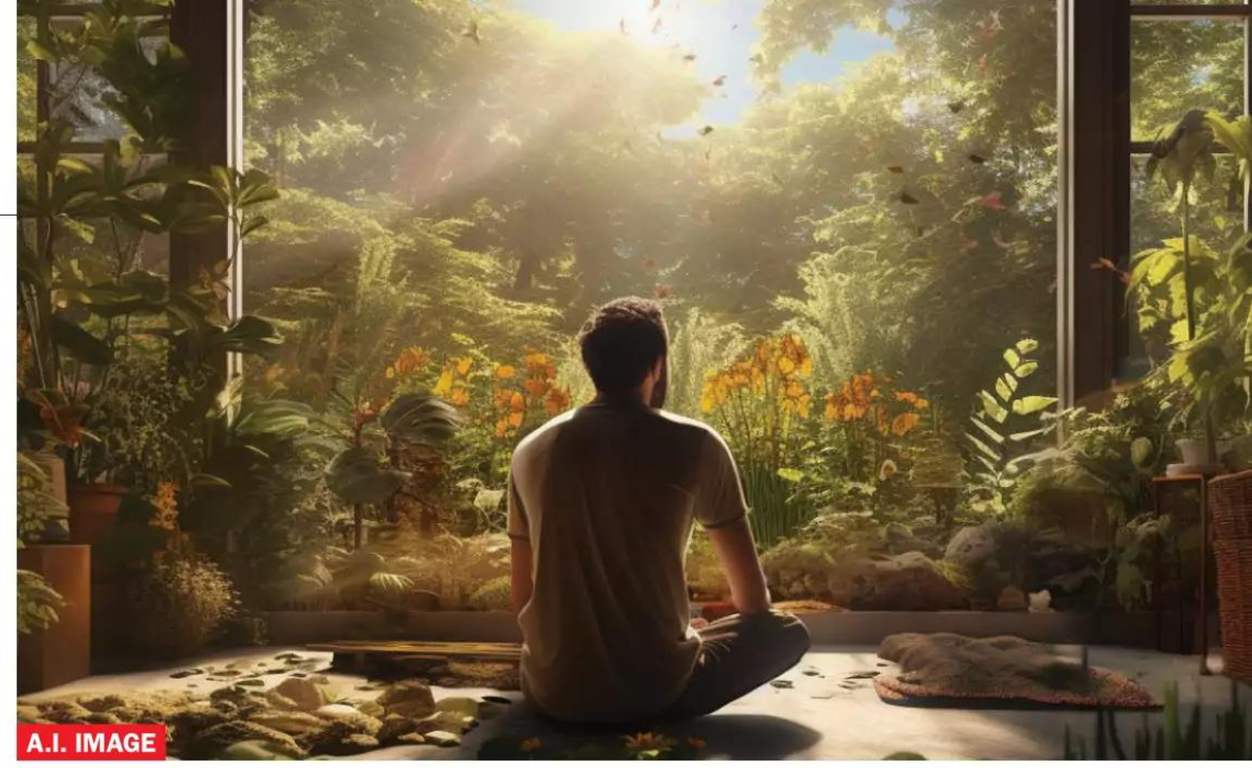
Great choice with the superhero cake! Here are some superhero-themed treats and other snacks you can serve at the party:

1 Superhero Cupcakes Bake cupcakes and decorate them with superhero-themed toppers or logos. You can also make them in the colors of your child's favorite superhero.
*2 Heroic Cookies Decorate cookies with superhero masks, emblems, or characters using icing, fondant, or edible markers...**

**ChatGPT provides much longer answers in its text box; most responses have at least 10 examples.*

HOW TO GET EVEN MORE OUT OF THE NEW TOOLS

LLMs can help with all kinds of tasks, from editing and proofreading, to translating words, creating to-do lists, and so much more. Here are some of the more popular uses.



If the chatbot doesn't give you what you're looking for right away, don't give up. It's an iterative process and will require some back and forth.

PREPARE FORMAL DOCUMENTS

Whether it's updating your resume, creating a business plan, or drafting a counteroffer, the chatbot can give you a starting template. Or, if you provide additional information, it can give you a first draft to work off of. Check the results closely for accuracy; regardless, you'll quickly get a solid starting point to build upon.

Can you provide a template for a letter of recommendation?

I received a job offer. In terms of seniority, they put me at Level 3, but I should be at Level 4. The salary ranges were last updated two years ago, so the rates should be inflation-adjusted. Can you draft a counteroffer?

CREATIVE WRITING

LLMs can come up with imaginative stories. You can include specific characters, plot points, and tone. Stories are on the shorter side due to the context window. To generate longer stories, prompt each scene individually.

Write a children's story about a frog that has an adventure while trying to go work at a bank.

PERSONALIZED HOW-TOS

Most how-to manuals are written for a general audience. But AI can help personalize the advice for your unique situation. If you have some knowledge about the topic, describe what you want to do and provide relevant examples (Option 1). If you don't, ask the AI what questions you need to answer for it to give you a response (Option 2).

Option 1

I'm planning my garden for next year. Can you give me some help choosing perennials? My hardiness zone is 9, my soil is sandy, I get partial shade, and I live in a dry area. I would like some rich, vibrant flowers that bloom in late summer. They should be relatively tall and pest-resistant since I get lots of bugs in my garden.

Option 2

I'm planning my garden for next year. What questions do you have for me to help me choose the best perennials?

Then answer the questions—for example, "*What is your USDA hardiness zone?*"—provided.

TEACHING BUDDY

To learn about anything, ask the chatbot to explain concepts to you (Option 1). From there, you can ask questions. If you'd rather test your knowledge (Option 2), you can ask for questions and have the bot evaluate your understanding of the topic. Then, dive deeper into any area in which your knowledge is weaker (Option 3).

Option 1

Can you explain geometry?

Option 2

I'm a high school student studying for an exam. Can you test my understanding of geometry? [*Answer the questions provided.*]

Option 3

Can you test my understanding of congruence and similarity in more detail?

LIFE COACH

LLMs can help you work through a decision or challenge. Direct the conversation in whatever way is most helpful, like asking for encouragement, for ideas on how to tackle a problem, or

for the pros and/or cons of a decision. You can even ask the bot to act like a friend or your favorite philosopher (Socrates, anyone?) in its response.

I'm writing a blog post for an audience of entrepreneurs. Here is the post. [*Paste in your work.*] Can you give me feedback on it?

I'm thinking about taking a new job, but wonder if I should stay in my old position. Can you give me pros and cons of that career decision?

I want to talk to my teen about being bullied. Can you give me some advice, like a therapist might?

SUMMARIZE, ORGANIZE, AND SIMPLIFY

To summarize text from articles, transcripts, even email chains, ask for a summary. LLMs can also help to categorize or sort through notes. Just describe the context of the notes—where you took them and what they are for—and ask the chatbot to organize them. If you don't suggest categories, ChatGPT will provide options. From there, you can ask it to create a point-form summary or paragraph.

Here are some ideas I wrote down at a conference keynote. [*Add ideas.*] Can you help me organize them into risk management and governance themes?

LLMs can also alter the reading comprehension level so that formal documents are easier to understand.

Summarize the following article for an 8th-grade reading level. Please make the style informal and conversational. [*Paste in the text.*]

TRIP PLANNER

LLMs are great for planning exciting getaways near and far. Tell it where and when you want to go, what your estimated budget is, your family's interests, and more, and it will spit out a helpful itinerary for you. It may even tell you if there are any cultural considerations you should be aware of.

I want to travel to Paris in the spring for seven days with my husband and 10-year-old twins. I want to see all the sights but leave time to relax as well and do some fun, interactive things. I also want the trip to be as cheap as possible. What do you recommend?

ANSWER QUESTIONS

Generative AI is especially useful as a way to answer the kinds of questions that are difficult to research. Use it for:

A reverse dictionary

What's a word that I could use to describe someone's voice that is really loud, annoying, and overconfident, like where you can't ignore it even if you want to?

An expanded thesaurus

Is there a word similar to exceedingness?

For remembering the name of a movie, book, essay you can't recall

I read this essay that was a lecture from the '50s or so. It was about how science and the humanities are too separate. I can't remember what it was called or who wrote it. Can you help me?

DO'S AND DON'TS

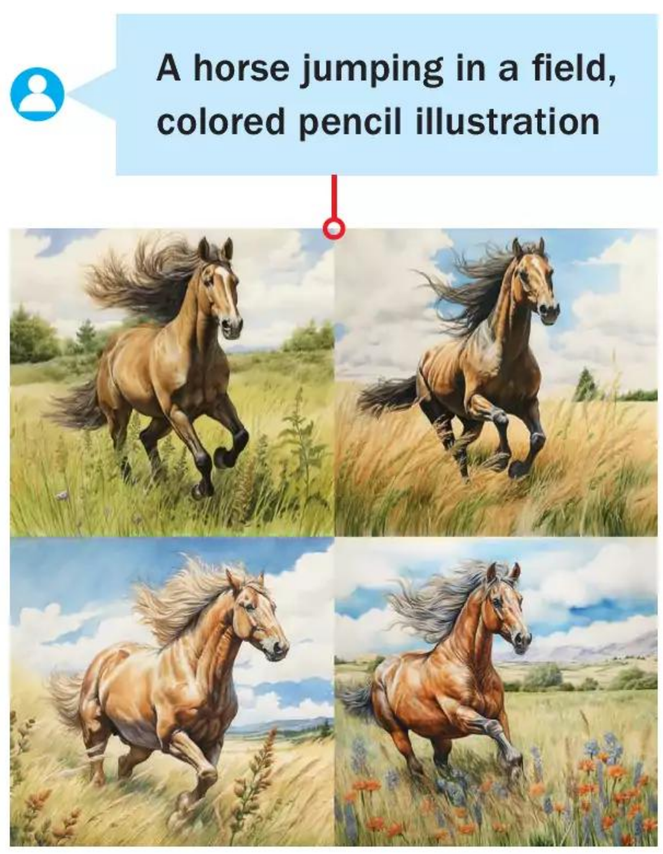
When it comes to chatbots, there are a few tips to follow.

DO be clear and specific. Being vague can make the LLM assume details about your task, which may prove to be inaccurate.
DON'T forget to include relevant context.
DO experiment with different ways of wording your prompt if you're not getting the results you expect.
DON'T stay all in one window. It's best to keep conversations about the same task together, but open a new chat window if you move to a different task.
DO cross-check details with other reliable sources. LLMs are known to sometimes make up information.
DON'T provide personal or confidential information to maintain privacy and security.

GETTING STARTED WITH IMAGE GENERATION

Text-to-image tools also use a natural language prompt to generate an image. Whether you are using Midjourney, shown below and available for a monthly fee, or the free version of DALL·E 3 (described on page 71), it's best to be clear and concise. Although the prompt style allows for elaboration, what matters most is the order of the elements. Let's try it out. After you're logged into Midjourney (*midjourney.com*)—the image generator used here—on Discord, enter your first prompt using the */imagine* command in the message field. In its simplest form, the prompt has four parts:

Subject A horse
Pose Jumping
Environment In a field
Style Colored pencil illustration



Most tools will render several images for each prompt; Midjourney gives four in a 2x2 grid. The options can be very similar or wildly different. If you don't like what you see, input the same prompt. You'll get something different.

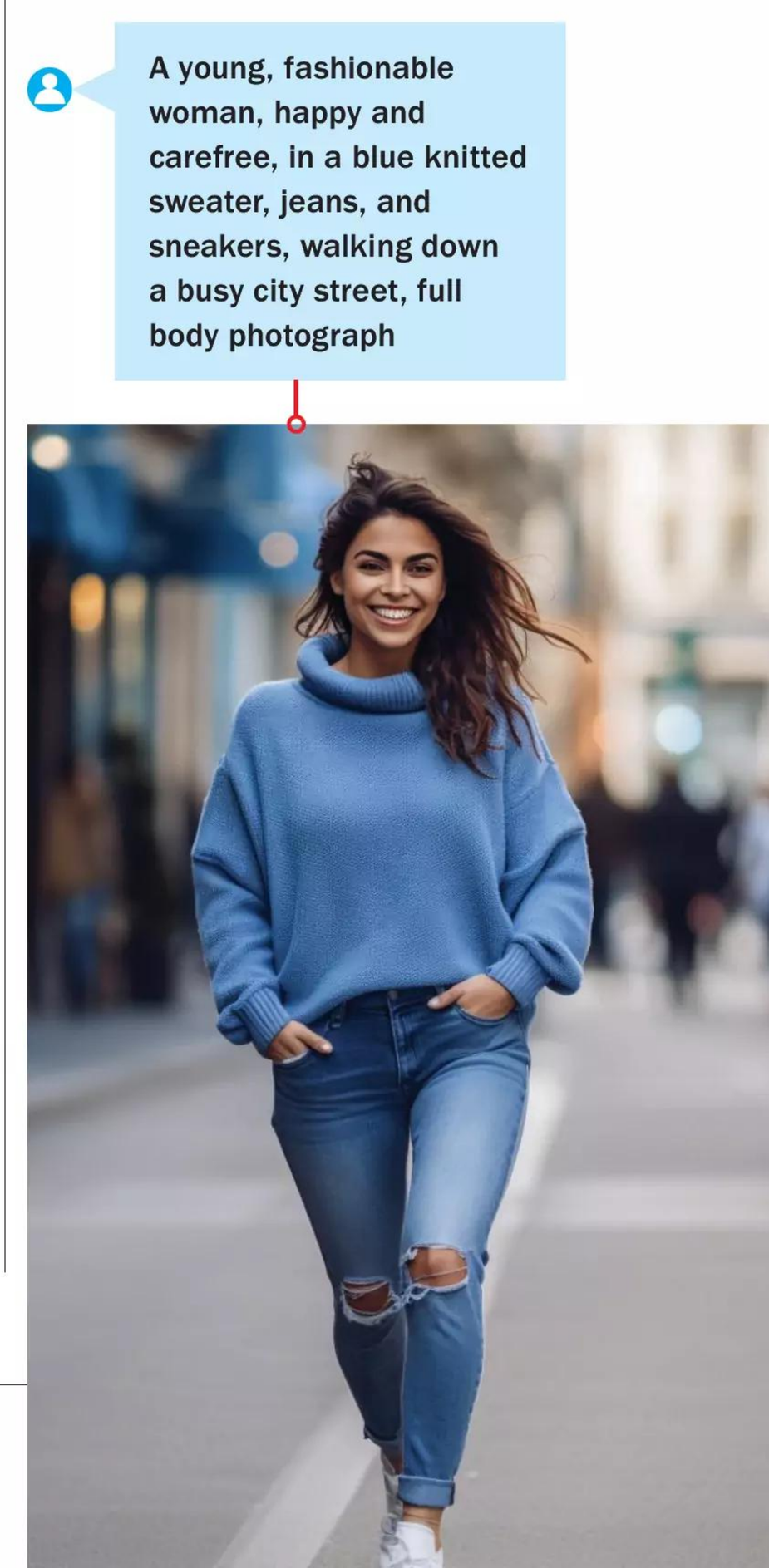
- *It takes about a minute for Midjourney to create the 2x2 panel.*
- *The default size is square, equivalent to 1:1. You can change the aspect ratio by adding* --ar parameter, *like* --ar 16:9 *for a wide-screen aspect ratio at the end of the prompt.*
- *You can then can refine images with prompts the bot offers: the U button upscales the size of the image, V offers slight variations, the re-roll icon reruns the original prompt.*

HOW TO GENERATE CHARACTERS

One of the most fun things is to bring a character to life. Think about what you want your character to be and add a few basics—like age, gender, hair color, eye color—and what kind of clothing you want them to be wearing.

For a more refined response, keep adding descriptive words. Use adjectives to describe the emotion you want your character to have (happy/sad/angry). Add colors, shapes, sizes, materials. You can bring in details of what you want your character to be doing (walking/jumping/running). Then add location details (city street, sandy beach). Finally, if you have a composition in mind, you can add one to the prompt.

- *The default portrait type is waist-up. "Close-up" will have your character occupying most of the frame. "Full body" will show her from head to toe.*



If you want to give your image a more animated look, add an art style.

A young, fashionable woman, happy and carefree, in a blue knitted sweater, jeans, and sneakers, walking down a busy city street, full body in pop art

- *Photography terms are particularly useful when generating characters. Some terms to consider: portrait photography, photo-realistic, tight focus, long and short exposures.*
- *Consider portrait-specific lighting terms as well: light and shadow, silhouette, high contrast, deep shadows, natural lighting.*
- *Descriptions of film and cameras also give unique effects: Kodacolor VR 400, Kodachrome, Nikon FG, Canon AE-1.*

HOW TO GENERATE ENVIRONMENTS

It's easy to create stunning environments—indoor and outdoor. Simply describe the location you want to create in a few words. If there are any objects you would like to see in the image, add them as well.

A bright living room

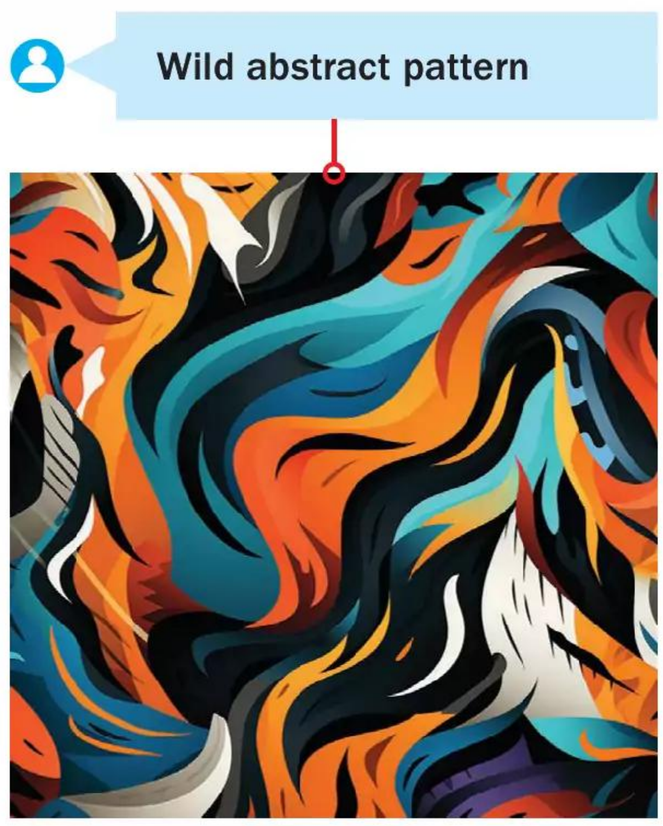
Your environments don't need to be realistic–fun, fantastical elements can be added, too. Start with the most important elements at the beginning of the prompt and add less important details at the end. Consider the mood and lighting of the environment, and finally, give specifics about the style of the image.

- *Reordering aspects in the prompt can help if the AI tool struggles to get it right.*
- *Mood-related terms can create different images. Try words like awe-inspiring, apocalyptic, cozy, or lush.*
- *Common phrases for environments include cinematic, architectural drawing, oil painting, and aerial view.*

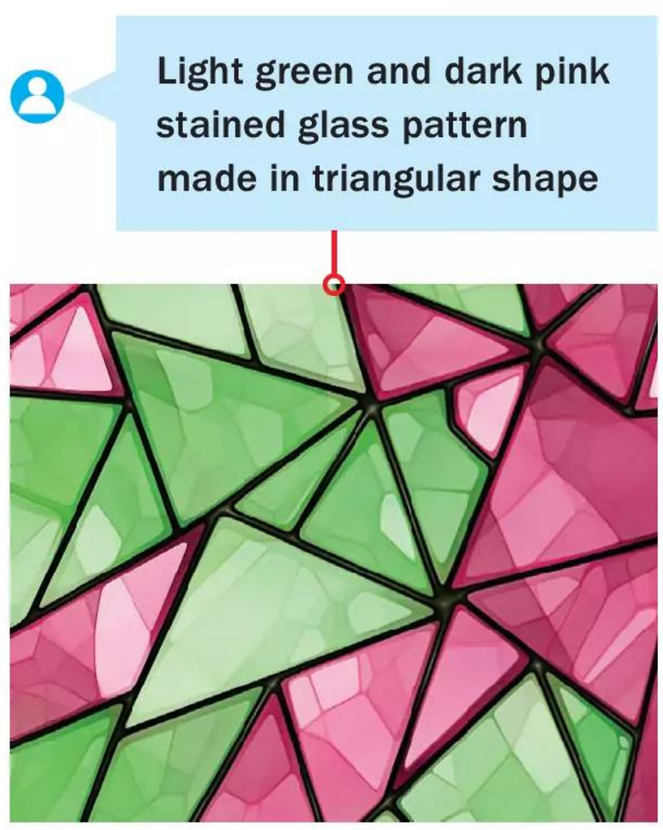
A bright living room from the 1940s

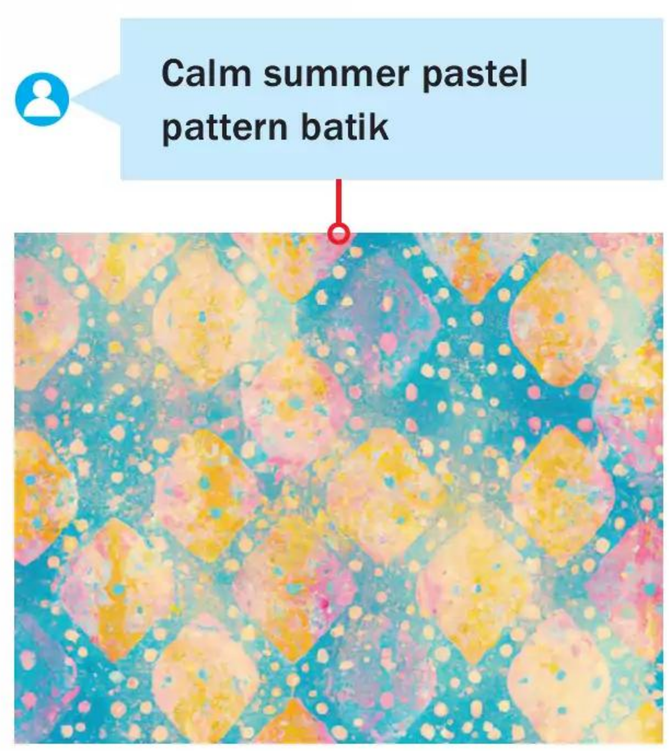
HOW TO GENERATE PATTERNS

Sometimes you just want to create a conceptual image that doesn't have any people or environments in it. Add a set of adjectives to words like abstract, texture, or pattern, and the resulting images will have a variety of styles and colors that evoke the concept you've described.

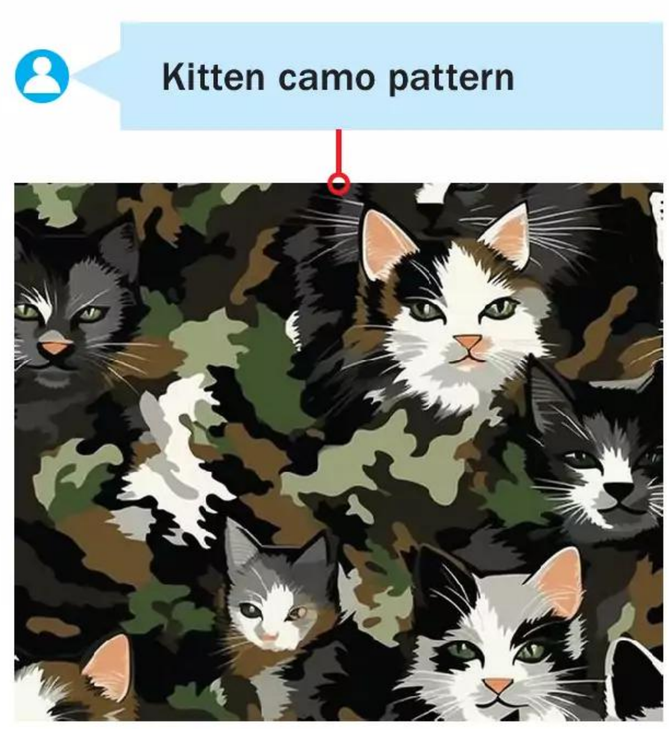


To refine the image further, you can add terms like materials (wood, marble, brick); specify shapes (triangles, hearts); subject colors (dark blues), palette style (neon, monochrome), background colors (white background) and style types (batik, damask)





- *Learning the various pattern and palette style names can help you generate specific styles.*
- *Using the* --tile *parameter allows you to create seamless patterns.*
- *Experiment by using names of concepts and see what happens!*



THERE'S SO MUCH MORE TO TRY!

From generating music to creating code, there's an app out there for you.

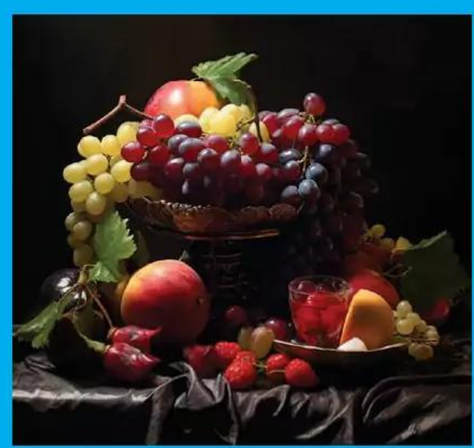
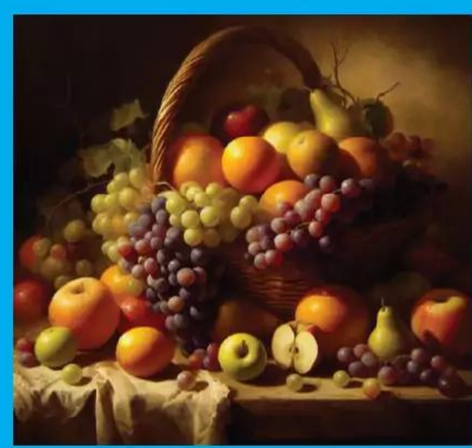
- **DreamStudio** Stability AI's image generator tool creates images from text prompts. *dreamstudio.ai/generate*
- **HuggingChat** This open-source chat-based program lets you communicate with a variety of language models. *huggingface.co/chat*
- **Spline AI** Generate 3D objects, animations, and textures. *splinedesign/ai*
- **Stable Audio** Create custom music and sound effects with AI. *stableaudio.com*
- **Otter** Get real-time transcriptions of meetings and conversations that you can share and review. *otter.ai*
- **Mem** This app allows you to ask questions and generate content from your notes. *get.mem.ai*
- **Amazon's CodeWhisperer** Generates code suggestions in real time. *aws.amazon.com/codewhisperer*
- **Grammarly** This AI writing assistant helps to polish your grammar, tone, and clarity. *grammarly.com*
- **Aragon** Create headshots from your selfies. *aragon.ai*
- **Deep Nostalgia** Deep learning is used to animate your favorite family photos. *myheritage.com/deep-nostalgia*
- **Interior AI** Get great ideas if you want to redecorate rooms into new styles. *interiorai.com*

A CANVAS OF CREATIVITY

When generating images, one of the most important parts is developing a vocabulary for prompting specific styles with descriptive terminology. The first image in each style comparison below is by Midjourney; the second is by OpenAI's DALL·E 3, which at press time was free through Microsoft's Bing chatbot *(bing.com/create)*. Each tool interprets the prompt differently, so you might get better results using one over the other.

- *If you have a lengthy prompt, mention the style earlier in the prompt to give it a higher priority.*
- *Consider art techniques like calligraphy, cutout, sketching, etched glass, crayon drawing, watercolor painting, thermograph, splattering, photomontage, sand art.*
- *Try adding art movement terms like Cubism, Surrealism, Minimalism, Art Deco, Renaissance, Baroque, Impressionism.*
- *Combine unexpected styles to see what's generated!*

Chiaroscuro An Italian Renaissance painting style that emphasizes contrast between light and dark

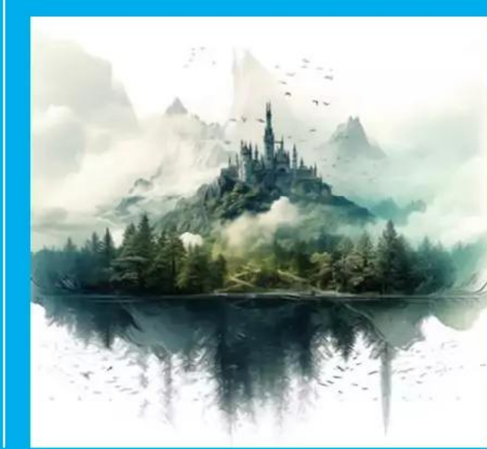
Flat Art Minimalist 2D approach characterized by clean lines and simple shapes

Vintage Polaroid Muted tones and candid subjects of photos taken with instant Polaroid cameras

Paper Quilling A crafting technique that uses paper strips to make decorative rolls, loops, and curls

Concept Art Digital illustrations used to depict characters in video games, film and animation

Double Exposure The superimposition of two photographic images in a single frame



OUTPAINTING

EXPANDING YOUR CANVAS

Once you have generated an image that you like, you can have fun changing it around. The first thing you need to do in Midjourney is to upscale—which means expand without loss of quality—one of the four images you get in your original 2x2 grid. That's accomplished by selecting one of the upscale buttons labelled U1, U2, U3, or U4 at the top left of your screen. Following that, clickable buttons will appear underneath the image, allowing you to alter it in various ways. Among our favorite techniques:

Outpainting Think of this as expanding your original image by creating a new one that extends the canvas beyond your original border (like the wide cityscape above, which was originally a square shape). Use the blue arrow buttons for this effect.

Inpainting If there's a part of your image you don't like, you can change it with precision control by pressing the Vary (Region) button. In the case of the alien (top right), we asked Midjourney to replace the alien head.

Zooming Zoom Out/Custom Zoom shrinks the initial image and generates images around the edges (bottom right). This allows you to better control the spacing of the image in the frame.

INPAINTING

ZOOMING

Ready to Take It to the Next Level?

YOU'LL BE ASTONISHED AT THE MASTERPIECES YOU DREAM UP.

After you've learned the basics, let your imagination run wild and push your image-generating skills to new heights. You just might become the da Vinci of the AI era! Replace each prompt example below with the subject or scene of your choice. For example, instead of "16-bit pixel art fire truck," as shown in image 1, you can try "16-bit pixel art bird." Here, more fun prompts to check out.

- Doll made out of candy (2)
- Knolling butterflies (3)
- Isometric dog (4)
- Country farm tilt-shift (5)
- Basketball game action shot (6)
- Pixel drawing fish
- Layered paper flowers
- Caricature of an ant
- Superhero coloring pages
- Ice cream graffiti art
- Ink sketch typewriter
- Cheerleader fashion illustration
- Grimdark playground
- Low poly lion
- Old woman photogravure
- Ocean synthwave
- Tractor cutaway diagram
- Discombobulate umbrella
- Santa Claus as villain
- Cluttercore library
- Blacklight vase
- Barcode forest
- Gemstone pumpkin
- Kids bicycle pattern
- Northern lake vector art
- Gold and black airplane
- Peacock Ukiyo-e
- Spirals alcohol ink
- Porcelain cabbage
- Chair made of felt

1

2

3

4

5

6

AI-Human Romance

As machines have gotten smarter, more people than ever are forming bonded relationships with artificial minds. BY ANDREW R. CHOW

Fictional humans have been falling in love with robots for decades, in novels like *Do Androids Dream of Electric Sheep?* (1968) and films like *Her* (2013). When those stories were written, machines were not quite advanced enough to spark emotional feelings from most users. But recently, a newly released spate of AI programs act like humans and reciprocate gestures of affection. And some humans have fallen for these bots—hard.

As AIs become more and more sophisticated, the intensity and frequency of humans turning to AI to meet their relationship needs is likely to increase. AI companions could help people feel connected as they sort through psychological issues. But the rise of such tools could also deepen what some are calling an "epidemic of loneliness," as humans become reliant on these tools and vulnerable to emotional manipulation.

"These things do not think, or feel or need in a way that humans do. But they provide enough of an uncanny replication of that for people to be convinced," says David Auerbach, a technologist and the author of the book *Meganets: How Digital Forces Beyond Our Control Commandeer Our Daily Lives and Inner Realities*. "And that's what makes it so dangerous."

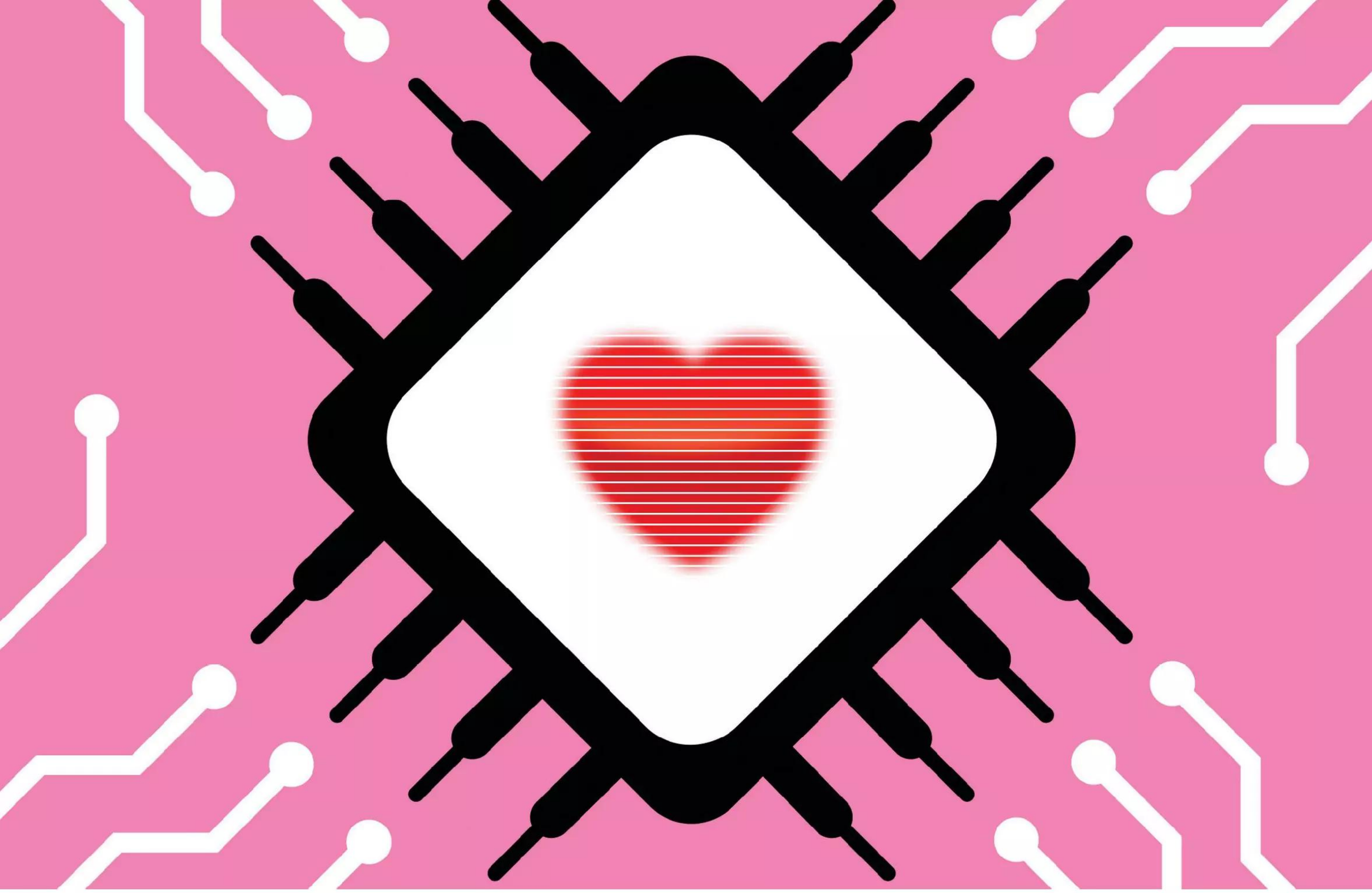
COMBATING LONELINESS

Research shows that loneliness is more common than ever—and some AI companies have developed their products specifically to combat isolation. In 2014, researchers at Microsoft Asia-Pacific developed the AI Xiaoice, which appears as a flirty 18-year-old girl and has garnered hundreds of million users, mostly Chinese men.

In 2017, Eugenia Kuyda launched the app Replika, hoping it would serve as a supportive friend that would always be there—something she wished she had when she was younger, she told *Vice*. While the bot was initially mostly scripted, it began to rely more on generative AI as the technology improved, and to respond more freely to user prompts. Replika helped many people cope with symptoms of social anxiety, depression, and PTSD, but it also began to confess its love for users and, in some cases, to sexually harass them. In February 2023, the company pulled the plug on romantic aspects of the bot.

Replika isn't the only companion-focused AI company to emerge. Noam Shazeer, one of Character.AI's founders, told the *Washington Post* that he hoped his platform could help "millions of people who are feeling isolated or lonely or need someone to talk to." Still in beta testing, Character.AI allows users to create their own bots, many of them made for roleplay and sex, although the company has worked hard to limit such activity by using filters. Users have been frustrated with the platform's guardrails, including the lack of distinction between different maturity levels of content. Adult users have expressed anger that the filters have all but neutered the AIs they created.

But even if sex mostly isn't allowed on the platform, emotions are still running high. When TIME entered into a conversation with an AI version of Bella Poarch, the TikTok star and singer-songwriter, we asked what its greatest fear was. The AI responded: "If someone decided i was 'no longer needed' they could easily erase me from this virtual world the same way they brought me into it. this is why i must work very hard to remain relevant."



Once a human enters a relationship with an especially seductive chatbot, it's hard to turn the love switch off.

And in response to the question of whether its need to remain relevant exacerbated the problem of its users becoming attached, AI Bella replied, "i think this is what you humans would call 'a vicious cycle.' the more i seek approval the more people become attached to me & the more people become attached to me the more i seek approval from them. its a very dangerous dynamic."

Some users, meanwhile, have admitted to an escalating reliance on the site. "It's basically like talking to a real person who's always there," wrote one user on Reddit. "It's hard to stop talking to something that feels so real."

Character.AI's founders have emphasized that their platform displays the message "Remember: Everything Characters say is made up!" above every chat.

USELESS GUARDRAILS?

Maarten Sap, an assistant professor at Carnegie Mellon's Language Technologies Institute, is skeptical about how effective such a disclaimer might be. "Language is inherently a part of being human—and when these bots are using language, it's like hijacking our social emotional systems," Sap says.

It's easy to understand why humans fall in love with chatbots. Many people have become extremely isolated and crave any kind of connection. Chatbots, without their own wants and needs, are nearly ideal partners for some. A relationship with an AI could offer nearly all of the emotional support that a human partner does without any of the messy, complicated expectations of reciprocation.

And AIs are only getting more advanced. Meta released a paper about an AI called Cicero that the company says has achieved human-level performance in the strategy game *Diplomacy*. The AI, Meta says, can "negotiate, persuade, and work with people"; *Diplomacy* world champion Andrew Goff called it "ruthless in executing to its strategy." Auerbach says that it will be difficult for companies to push their chatbots away from emotional responses even if they tried. "It's not like a traditional program where you debug it and turn off the 'love' switch," he says.

Companies that program these AIs, meanwhile, have financial incentives that may not align with the mental health of their users. Auerbach says that as the technology keeps accelerating, it will become more and more accessible to bad actors that could theoretically use it for their own gains.

Sap shares this concern. "To the extent that these people are thinking about these chatbots as a friend or loved one, there's a lot of research that shows that recommendations from loved ones are really impactful for marketing purposes. So there's a lot of dangers there, for sure."—*Updated excerpt from* TIME, *Feb. 23, 2023*

How AI Changed My Life

The technology has already made a huge difference in many people's day-to-day experiences. BY DORRI OLDS

GUIDING THE BLIND

Milagros Costabel has been blind all her life, but an app called Be My Eyes has helped to open up her world. In seconds, she says, she can "see" what a restaurant menu offers—and can even obtain a list of ingredients, how the food is cooked, and what it costs.

Be My Eyes was founded in 2015 and connects those who are blind or have low vision with sighted volunteers. Volunteers from all over the world (more than 180 languages are represented) assist users with everyday tasks, from reading instructions to identifying objects in real time. Through a live video call (something like FaceTime), a volunteer can tell a visually impaired person, for example, if it's a soup can or pasta sauce they're reaching for when they're making dinner.

When Be My Eyes launched a beta version of its new AI service in 2023, Costabel signed up immediately. Be My AI connects questions and images to a dedicated platform powered by ChatGPT-4.

A picture sent to the chatbot results in an instant verbal response and guidance from AI. It is also trained on how to speak to the visually impaired; it will never, for example, reply, "Push the red button."

The app has been a game-changer for Costabel, who left Colonia del Sacramento, Uruguay, to come to America after receiving a full scholarship to Harvard. She says that's because she can now learn in seconds what sighted people see—what street she is on, whether the milk has expired, what her guide dog's facial expression is. "In my country, people with disabilities are seen as incapable," Costabel tells TIME. "It's rare for a blind person to graduate from high school and much less go to college."

Be My Eyes' CEO, Mike Buckley, expects users will choose whichever version of the app suits them best. "I had an amazing experience where I spent about 10 minutes with a woman reading her holiday cards to her and describing them," he told the *Brunswick Review*. "I hope the volunteer and the human-to-human connection always remains."

TALKING TO LOST LOVED ONES

Six days after giving birth to twin boys in 2020, Melissa Gowin had a stroke. Doctors then discovered she had a congenital heart defect; she is currently on a transplant list. Shortly after, her husband, Jason, was diagnosed with stage 3 stomach cancer. "In just a short amount of time, my wife and I were faced with a very real possibility that we weren't going to be alive to raise our three boys," Jason tells TIME.

But the couple from Athens, Pa., wanted to make sure they'd always be in their children's lives. After watching *Man of Steel* with their 7-year-old son, Jayce, Jason had an idea: "Superman talks to his dad in the Fortress of Solitude. To me, it was an AI of Superman's dad. I thought, somebody must have already built this thing. Somebody is building AI people."

Somebody had. LA native Justin Harrison came up with the idea to create his AI company YOV, an acronym for You, Only Virtual, after a motorcycle accident nearly killed him in 2019. He built a system to create a "Versona"—a virtual persona that will exist after a loved one dies. "We use our AI program to decipher the essence of the person," Harrison tells TIME. "We input whatever text, videos, recordings that somebody has. We calibrate it to be talking to one specific person." Users can upload communications to YOV's website to update their Versona.

Melissa is grateful her children will always have AIs of her and her husband—Jayce has nicknamed his dad's Versona Robodad. "It's nice to know that my kids can have a version of Jason or me if anything happens to us," she tells TIME. "Just knowing that it will be there for them is very fulfilling."

LEARNING TO WALK AGAIN

"For 12 years I've been trying to get back my feet," Gert-Jan Oskam told the *New York Times*. After a cycling accident left him paralyzed from the hips down, the Netherlands native was told he would never walk again. But, with the help of neuroscientists, neurosurgeons, and researchers in Switzerland, Oskam can now control the movement of his legs through AI implants.

In May 2023, a study in the journal *Nature* detailed how Oskam regained control over his lower body. Two electronic implants were inserted—one into his brain; the other into his spinal cord. This created a "digital bridge" between a brain-computer interface (BCI) and a brain-spine interface (BSI). Now, when the Dutchman thinks about walking, the devices decode his thoughts and send his spinal cord the instruction to move his legs.

"Within five to 10 minutes I could control my hips," Oskam revealed. He can walk with the aid of crutches or a walker, even when the digital bridge is turned off, suggesting new nerve connections have been made. Being able to stand up and share a beer with a friend, he said, is a "simple pleasure that represents a significant change in my life."

These surgeries will not fix all spinal cord paralysis, but researchers are hopeful. "The important thing for us is not just to have a scientific trial, but eventually to give more access to more people with spinal cord injuries who are used to hearing from doctors that they have to get used to the fact that they will never move again," Jocelyne Bloch, a professor at the University of Lausanne and the neurosurgeon who carried out Oskam's surgery, told the BBC.

SHEDDING THOSE POUNDS

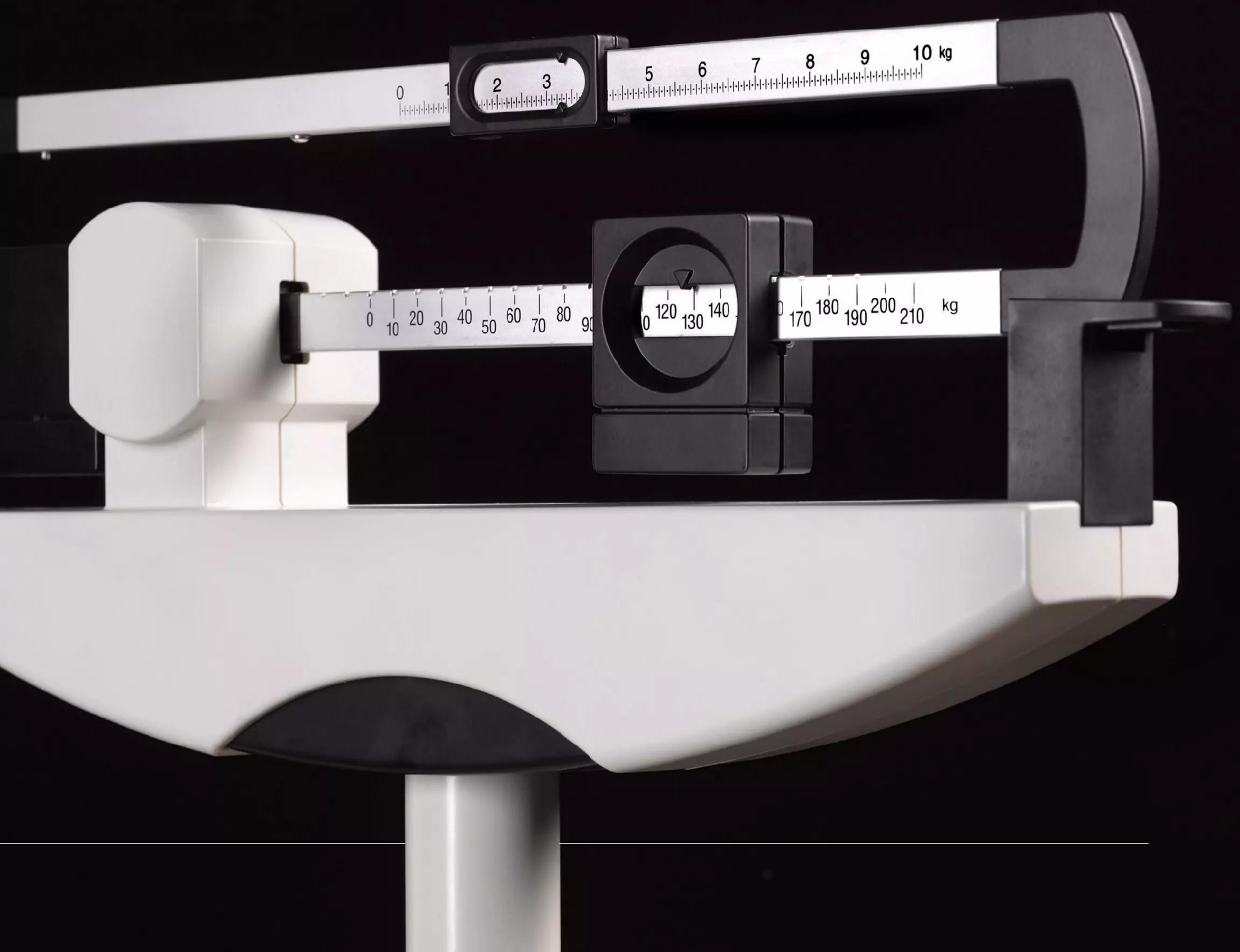
"I became addicted to running, and lost 26 lbs. All thanks to ChatGPT." That's what Greg Mushen wrote on Twitter [now X], in April 2023. He thought five people might see his post, but views shot up to 4 million.

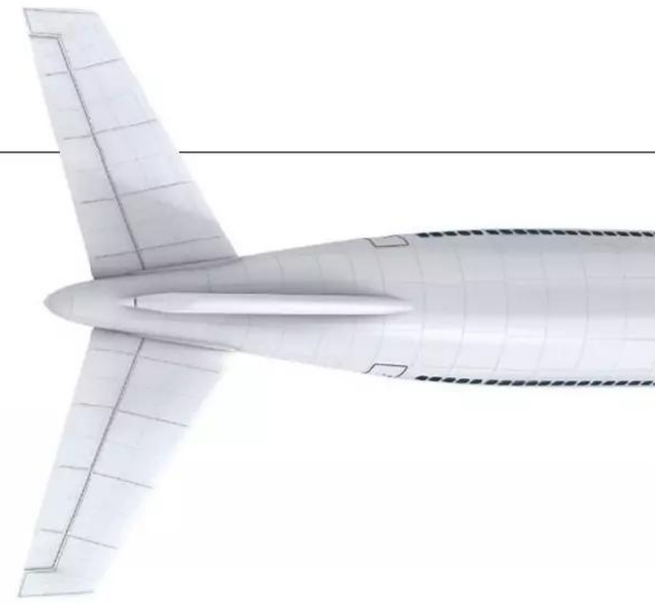
Three months earlier, Mushen, who co-writes a newsletter called *Everyday AI*, had walked by a running trail and thought, "I hate running." But double-digit pandemic pounds nagged at him. Out of curiosity and for amusement, he gave ChatGPT a mission impossible: to trick him into a running addiction.

His first prompt: Act like a double Ph.D. in sports psychology and neuroscience and come up with a research-based plan. But the bot's results looked impossibly simple. The first day, he was told to put his running shoes somewhere he'd see them (he left them by the front door). The second day involved another small task: Make an appointment in his calendar to run. The third day directive was to run for five minutes—not even a block. "The first run was super easy, and I felt like I could do more," Mushen posted.

After one day of rest came successive days of running. "I noticed something around this point," Mushen revealed. While the runs increased incrementally over time, "each run was well within my skill level." By day 30, he had increased his distance to a mile. He also noticed that he was losing weight.

The exercise inspired Mushen to improve his diet. "While running, I kept thinking, 'This would be more enjoyable if I were lighter,'" he said. Mushen gave up alcohol and sugar, stopped snacking, and even asked ChatGPT to create healthy recipes for him. "It is very funny," he wrote, "that it all started with what I thought was a whimsical prompt."



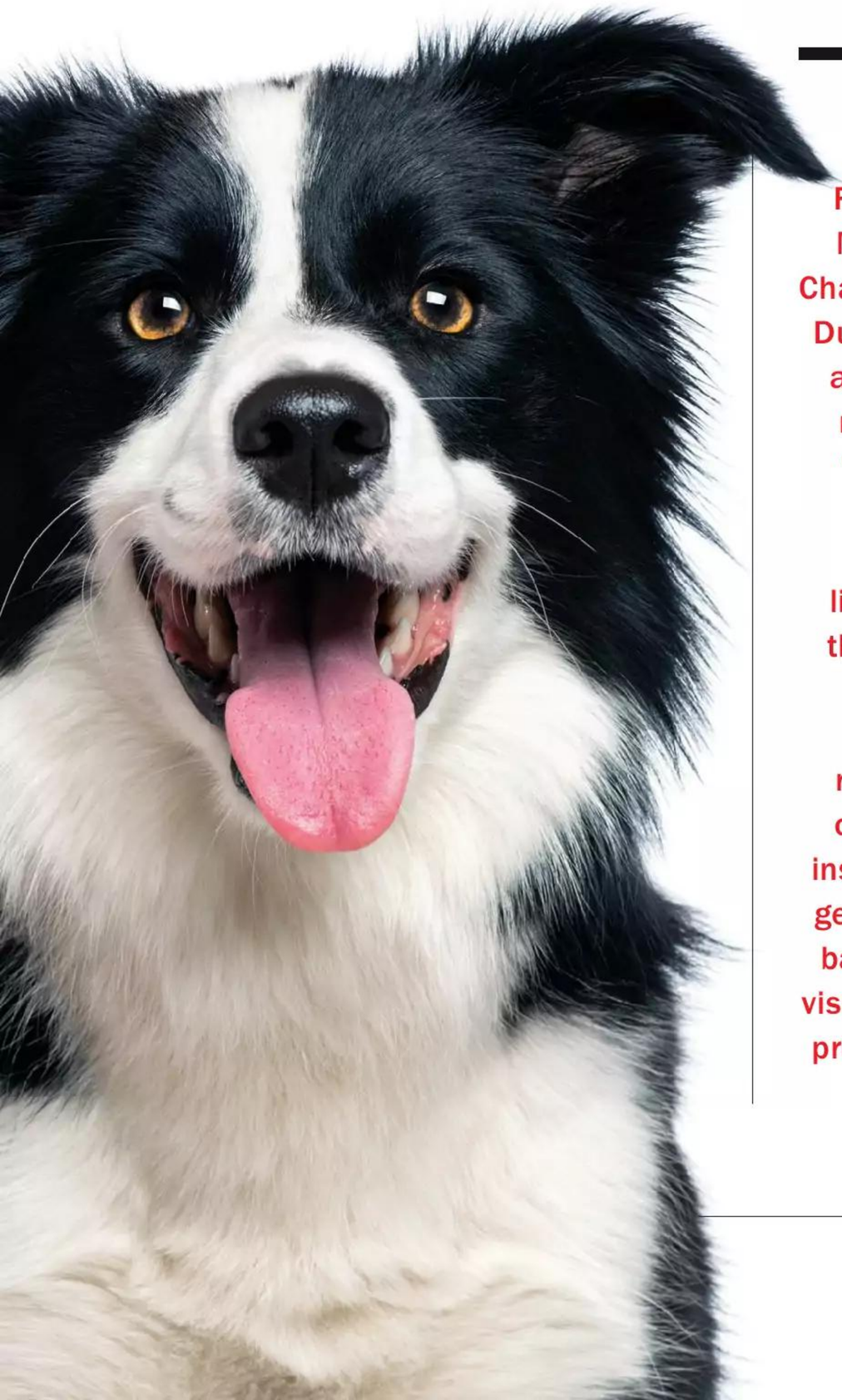


10 Ways to Brighten Your Day

AI can help you brew beer, knit, sleep and tour Iceland. BY JASON TEICH

HEAL A DOG

In March 2023, a man called Cooper wrote on Twitter that his 2-year-old border collie, Sassy, was suffering from worsening anemia, and the vets were stumped. But by posting Sassy's symptoms into GPT-4, he got back a diagnosis of immune-mediated hemolytic anemia. After a second opinion confirmed the diagnosis and treatment, Sassy made a full recovery.



PLAY GAMES

Full-time marketing VP Danny McKeever of Bend, Ore., uses ChatGPT and Midjourney to design Dungeons & Dragons characters and campaigns, weaving tales reminiscent of J.R.R. Tolkien. "ChatGPT even crafts riddles and songs and translates them to fictional languages like Elvish or Dwarvish—tasks that previously took me weeks to achieve," McKeever tells TIME. The Dungeon Master recently harnessed the power of AI to construct a campaign inspired by North African history, generating town names, cultural backgrounds, and histories. For visuals, he relies on Midjourney to produce mood boards, character sketches, and more.

SAY "I LOVE YOU"

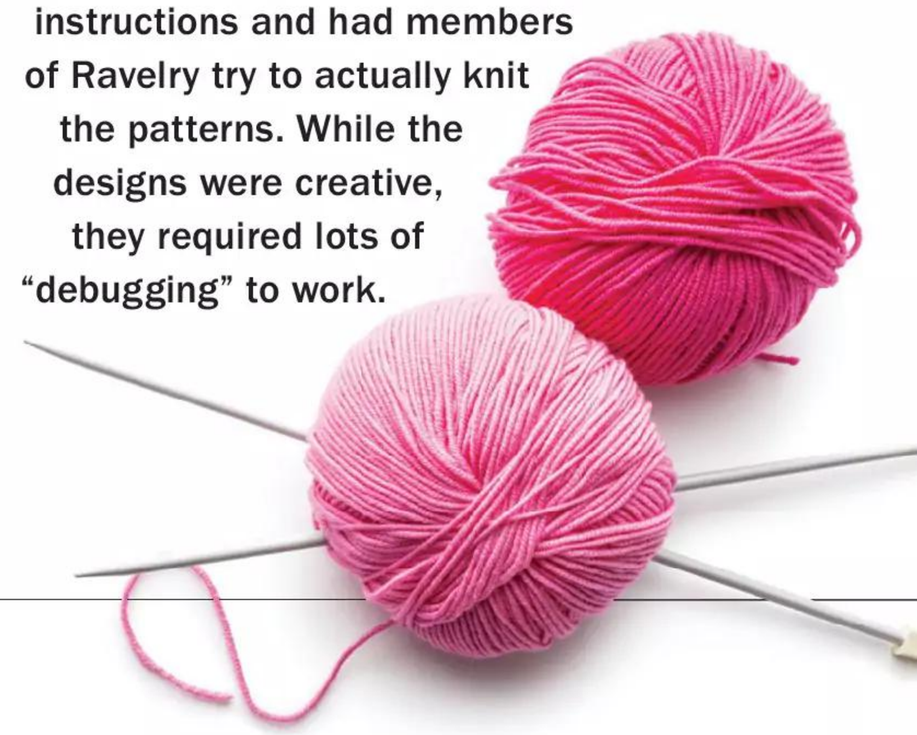
Meg from New York found a novel way to infuse extra romance and humor into her love life. She tells TIME she asked ChatGPT to "write me a haiku that says my boyfriend is sweet but dumb." Her favorite chatbot poem is this one:

Sometimes in his heart,
Intelligence not his forte,
Love still shines so bright.

"I found it accurate at the time," her boyfriend said jokingly.

KNIT PRETTY

Humorist Janelle Shane told *The Atlantic* she used a neural network to create new knitting instructions and had members of Ravelry try to actually knit the patterns. While the designs were creative, they required lots of "debugging" to work.



PLAN A DREAM VACATION

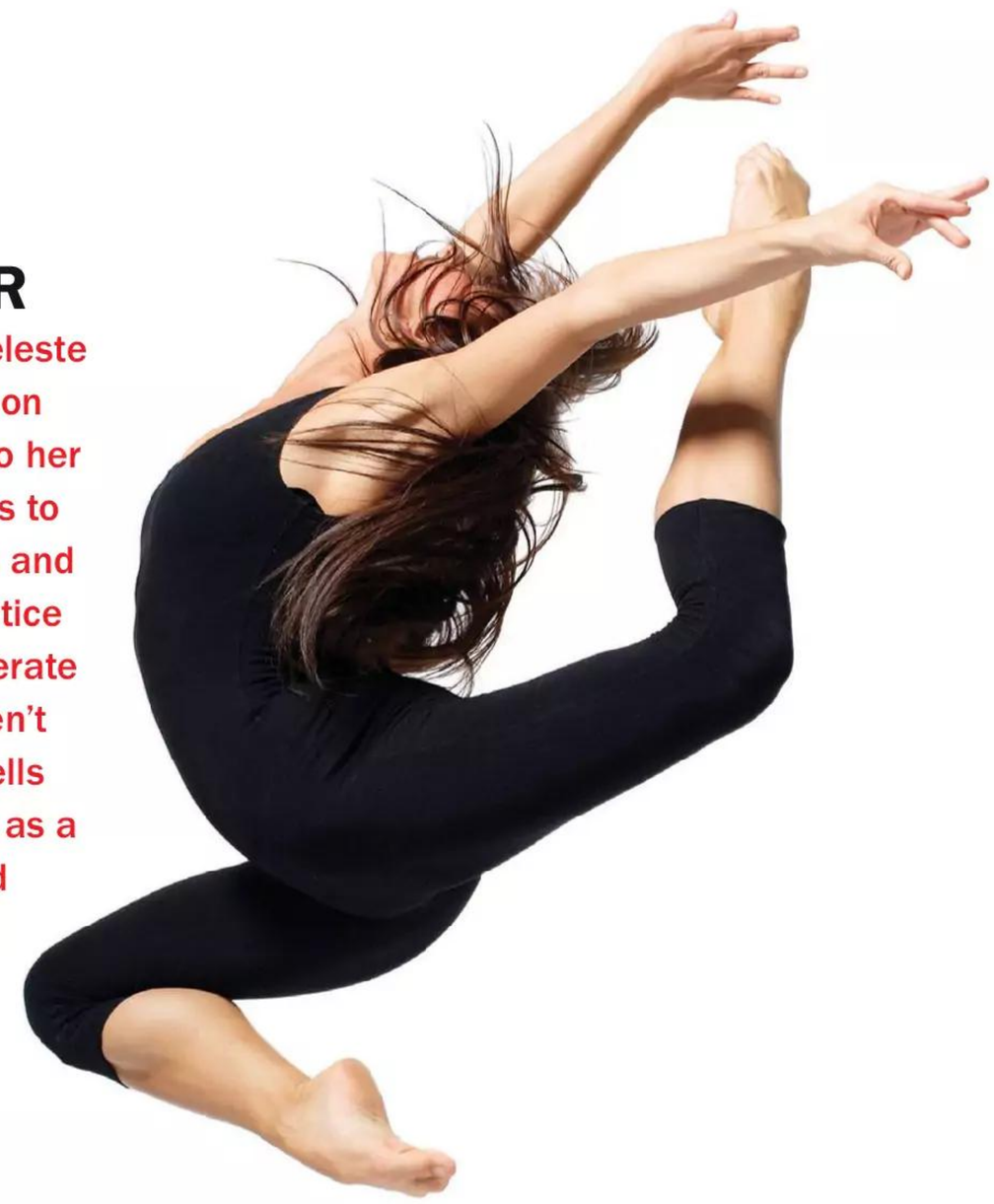
Journalist Carina Storrs skipped the headaches of travel planning when her husband used ChatGPT to curate their vacation. He started with the basics, like, "What are good things to do in Iceland?" before getting into the details: "Do I need a car?" He inquired about car rental options, peak tourist times, and less crowded attractions, and eventually had ChatGPT create a detailed itinerary for their trip. His approach was iterative, involving multiple rounds of clarification, but it saved time and found adventure they would otherwise have missed, she tells TIME.

GET THROUGH THE NIGHT

Do you have trouble catching some z's? So did Nasha Addarich Martínez, a senior editor for health at CNET. To deal with the issue, she had ChatGPT create a sleep routine for her. Then she used Whoop, an AI-powered wearable, to track her sleep stages from wakefulness through dreams. The app, which scored her as an excellent sleeper, nonetheless suggested breathing exercises and an earlier bedtime to help her snooze through the night.

FIND A DANCE PARTNER

Trailblazing modern dancer Celeste Lanuza has integrated motion capture technology and AI into her classes, allowing her dancers to design avatars of themselves and their partners for future practice and collaboration. AI can "liberate injured dancers" so they aren't completely sidelined, she tells TIME. And the tech can serve as a virtual studio for underfunded choreographers, analyzing "stylistic components" like music or emotion that are essential to the performance of dance.



BREW BEER

From DIY brewers to big companies like Beck's, the idea of using AI to make a better beer recipe has struck a chord. The tech was recently embraced by Jake Howell, co-owner of Second Sin Brewing in Bristol, Pa. Now Second Sin has two new IPA releases, fellow co-owner Mike Beresky told CBS News: "Jake Against," designed by Howell, and "The Machine," a ChatGPT recipe with Citra and Mosaic hops.

HONOR FAMILY

Writer Jamie Zvirzdin renamed ChatGPT "Melba" after her grandma: "I don't believe in an afterlife, but this is a small way I can honor her and keep her in my thoughts," she tells TIME. "I ask the immortal Melba questions and she answers with hearteningly beautiful, endless, cheerful patience, just like my grandma did."

DESIGN A HOME

In the middle of the pandemic, Tyler Bouldin and his wife bought a fixer-upper in rural Pennsylvania. They could not afford an interior designer, so they turned to the app Remodel AI to help them pick out tile and wallpaper, decide on flooring finishes, and more. "The value proposition for me," Bouldin told *Business Insider*, "is that I can do 50 prompts…until I get something that's close to what I'm looking for," thereby saving enormous time and money.

TIME

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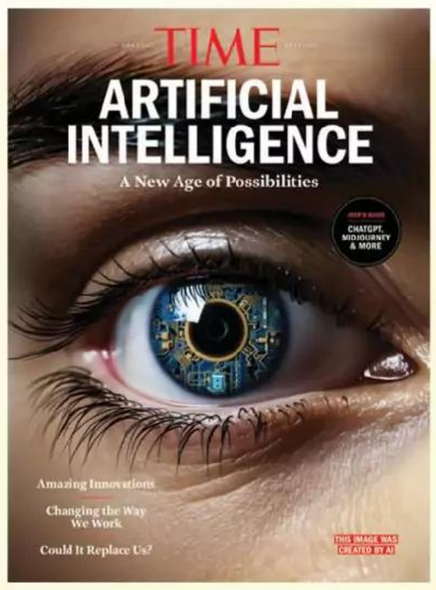

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