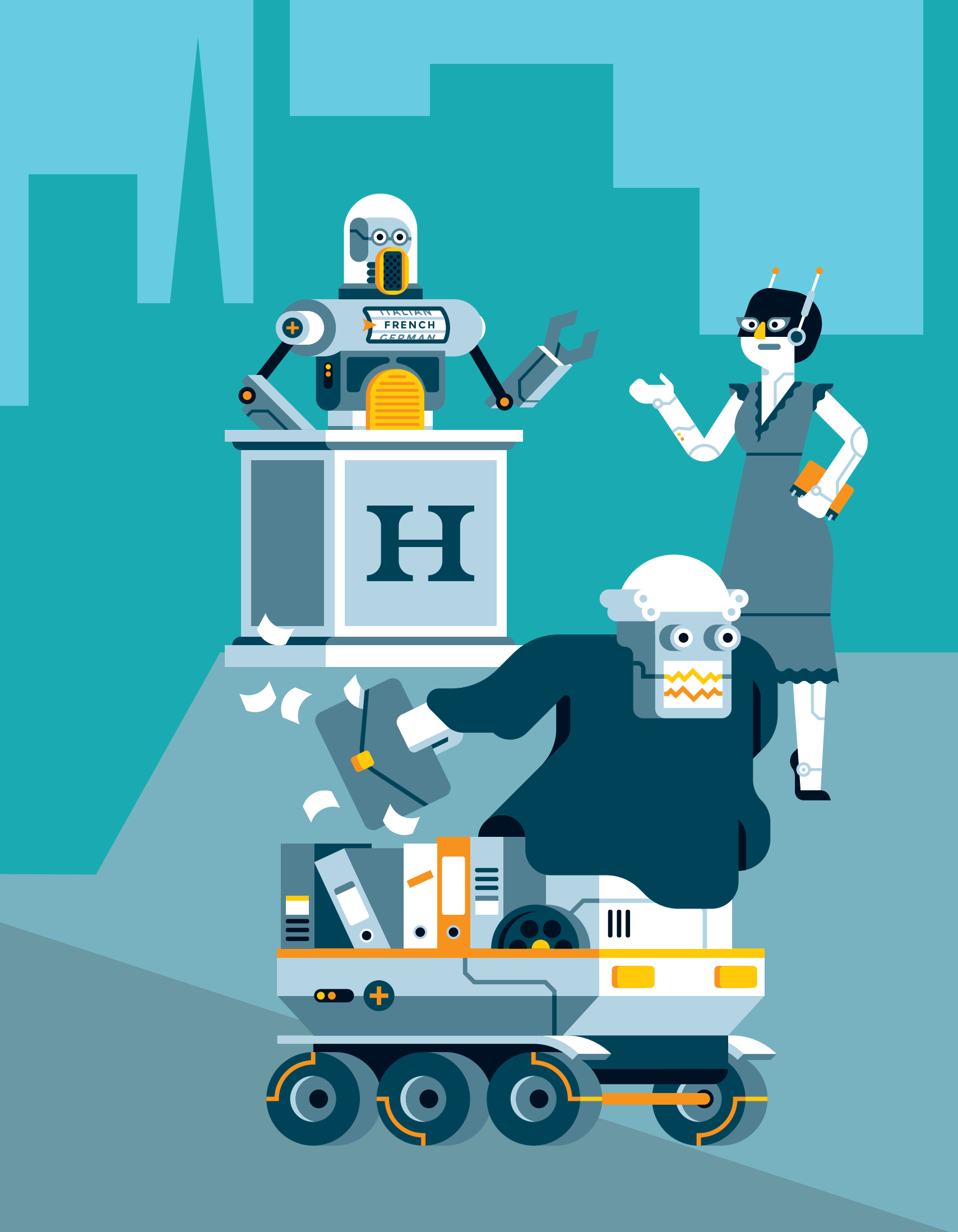


ARE YOU READY FOR THE NEW INDUSTRIAL REVOLUTION?

Artificial intelligence is playing a major role in our everyday lives and robots can now take on many of the jobs performed by humans. Is it time to panic?

Words / Sarah Warwick
& Mandi Keighran
Illustration / Goran Factory







It seems that Indiana Jones may soon be out of a job. This year, the University of Leeds in the UK launched a state-of-the-art robotic system that may, ultimately, replace the need for human archaeologists. The snake-like robots, which were recently used to find new information about the Great Pyramid of Giza, in Egypt, can climb up to 70 metres of crumbling masonry without damaging it, fit into confined spaces, deploy special cameras to explore interiors and use sensors to determine where to dig or drill. In short, everything a human explorer can do – and more.

Meanwhile, there's a new kind of doctor who can live in your smartphone. The Babylon medical app uses artificial intelligence to scan millions of pieces of data, allowing it to give an accurate diagnosis of your symptoms in seconds. Launched in 2015, in June this year it beat both an experienced nurse and a junior doctor in tests, diagnosing patients with over 90% accuracy.

Welcome to what experts are calling the Fourth Industrial Revolution. Following on from the mechanical, electrical and digital, this revolution – the 'cyber-physical' – might well prove to be the most dramatic, taking us into a world familiar only from Hollywood movie plots. Thanks to AI, computers now have the capacity to become self-learning machines: understanding speech, recognising graphics and making decisions based on access to incomprehensible (to humans) amounts of data.

The past six months have seen peak investment in AI. Startups in the US have raised \$1.5 billion – leading Albert Wenger, of Union Square Ventures, to describe it as “the Great Bot Rush”. Robots, algorithms and chatbots are becoming a part of everyday life, and AI is being employed in almost every sector of business, from farming to administration, journalism and the law. Scaremongering headlines predict that between one-third and 80% of all current jobs could soon be done by robots. So, should we be nervous?

Not yet, according to Lydia Nicholas, Senior Researcher in Collective Intelligence at Nesta, the UK's innovation foundation. “AI can now take over relatively simple and bureaucratic types of work, but we'll always need people.” Nicholas, who will be speaking on AI at this month's FutureFest in London, says the more interesting question is how society will evolve now there are other intelligent beings employed in problem solving. “It's not about replacing [humans]. It's providing something that we can't do. In an ideal world, you'd want access to both [sets of skills].”

For example, AI is excellent at analysing 'big data' at speed, as, says Nicholas, “machine learning can see patterns in higher-dimensional mathematics that are opaque to the human brain”, but they're not suitable for caring or creative roles. AI systems are also still very much in need of management, as they can't be trusted to know when the data they're analysing is flawed. (Remember #TayAi, the Microsoft Twitter bot that was corrupted by troll behaviour and became a sexist neo-Nazi within 24 hours?)

“AI doesn't understand about the world around it,” says Nicholas. “It doesn't think, if I press down here, other parts will get pressed too. It's like the case of two Amazon bots that got stuck in a feedback loop and a book on debt ended up costing 14 million pounds.”

There are still some big questions about what these new intelligent cyber systems will do, especially for those in traditionally white-collar jobs, such as administration, the law and accountancy. “The jobs that are most easily automated are routes into the middle class. How do you train people up in professions if you no longer need them to do those early tasks?” For now though, the human-robot synergy is set to improve things in every area, from office work to medicine (*read on for examples*). “AI is the most powerful tool we have,” says Nicholas. “As computers start to be able to learn for themselves, the system is gradually being optimised, which means everything we're doing is quietly getting better.”

Your wife is on line three...



MEET AMY INGRAM, YOUR NEW PA

Back in the *Mad Men* era, all execs would have had their own secretary, but these days, they've largely gone the same way as smoking, sexism and tea trolleys. Now, thanks to AI, overworked office workers can make like Don Draper with their very own assistant – albeit, one that's shared with millions of others.

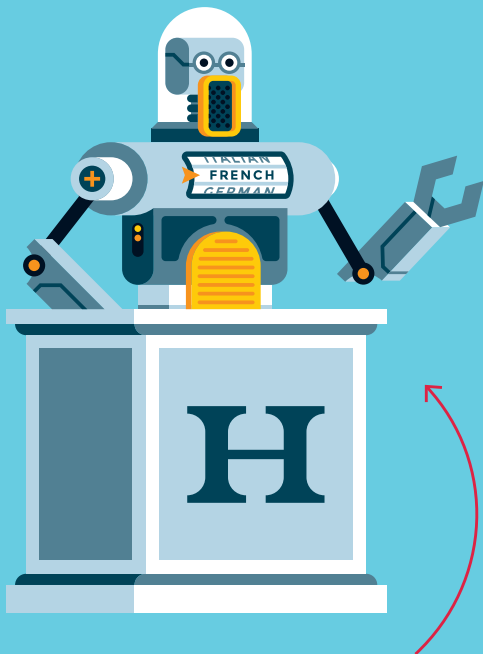
Meet Amy Ingram, the virtual personal assistant created by startup x.ai. She might have no body or consciousness, but she can still organise all your meetings for you. Simply sign up online, then copy her in to meeting email and she'll go back and forth with all participants to find a suitable time and place.

"We see this as giving time back to the average worker that they've been wasting doing this very tedious task that adds very little value," says Stefanie Syman, x.ai's Vice President of Communications. "Rather than demand that you interact with an app, these agents let you hand a job over completely and go do other things.

Thanks to a self-learning algorithm, Amy (and her brother, Andrew) get smarter all the time, learning people's shorthands and preferences, and scanning whole email chains to find clues to specific dates and times.

x.ai was wary of launching before Amy was accurate enough to be useful and it's taken two years for her to be "near perfect". "Good enough isn't good enough," says Dennis Mortensen, founder and CEO of the company. "If I don't trust Amy to set up meetings accurately every time, I can't use her."

[x.ai](#)



ROBOT CHECK-IN

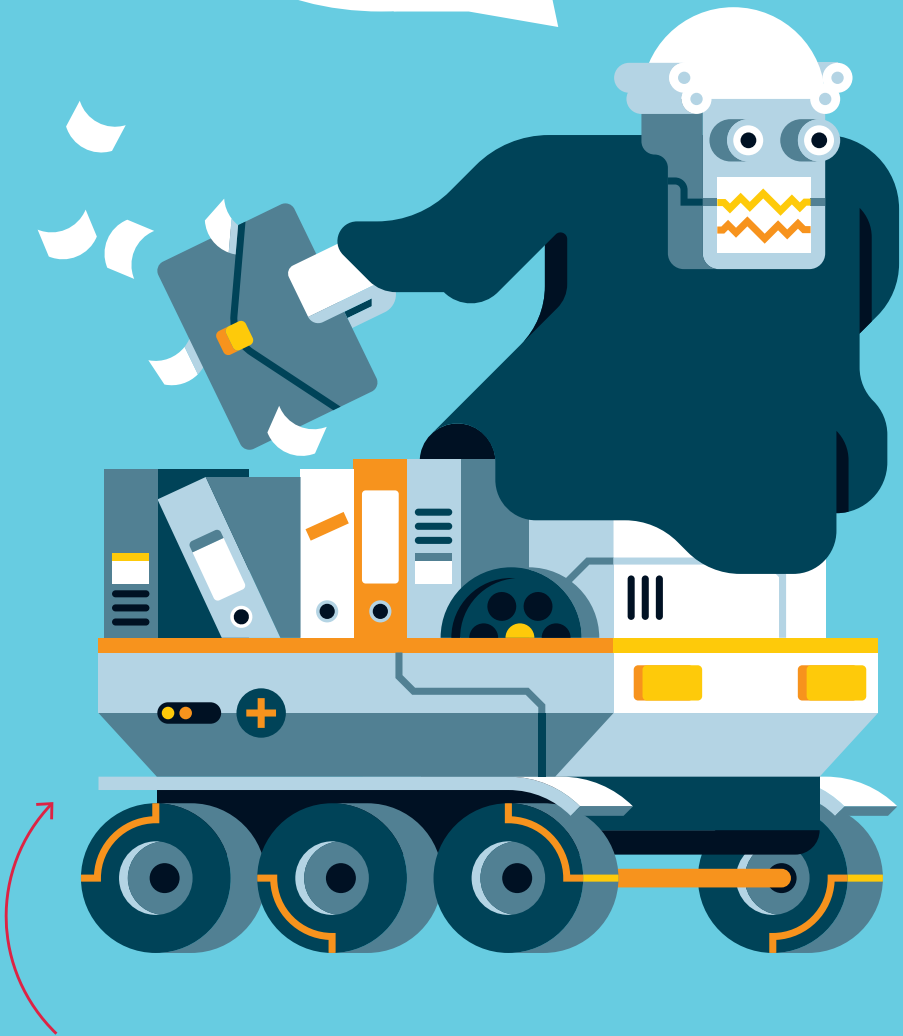
Walk into the Marriott Hotel in Ghent, Belgium, and you'll probably find – to your alarm – that the receptionist doesn't have a pulse. Mario is a humanoid robot, one of various automatons who already have roles in the travel industry. He can welcome guests to reception – in up to 19 languages – proffer keycards and answer simple, programmed questions about the local area.

This is just the beginning, according to Louise Hodges, European Head of Communications and Global Campaign Coordinator of Travelzoo, which carried out a dedicated study of 6,000 people from nine countries about consumer acceptance of robots and AI in travel. "Seventy-five percent of people said that robots could improve their travel experience," she says. "The Chinese and Brazilians even seemed to prefer robots to humans."

As AI becomes more advanced, cyber receptionists will start to add value to a hotel stay. Connie is a case in point. Launched earlier this year by the Hilton chain (and named after founder Conrad Hilton), the robot is embedded with IBM Watson technology, so it can learn, recall and make suggestions to guests. Eventually, all Connies will be connected on one network, sharing information on guests globally. "For large hotel chains, it makes sense, as when you pop up in a different country, the sister robot will still know who you are."

So will robot receptionists on day displace humans? Hodges doesn't believe so. "You can have all of the info, but it's still great to talk to someone," she says.

📍 travelzoo.com



GET OUT OF JAIL, FREE

Chatbots – basically, software that understands human language well enough to hold a simple conversation – have been big news this year, mainly for the way brands are using them to interact with customers, a kind of 'conversational commerce'.

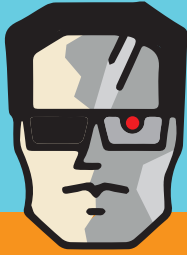
There is, however, a more altruistic use for this kind of AI, thanks to 19-year-old British programmer Joshua Browder, who invented DoNotPay, the world's first AI lawyer chatbot, to offer free-of-charge legal advice to people who might not otherwise be able to access lawyers.

"I feel like there's a gold mine of opportunities. So many services and

information could be automated using AI and bots are a perfect way to do that," says Browder. "It's disappointing at the moment that it's mainly used for commerce transactions, just ordering flowers and pizzas."

Since launching last year, DoNotPay has received press around the world for successfully appealing 160,000 parking tickets in London and New York, saving drivers over US\$4 million in fines (an impressive 64% success rate). This smart bot can also help claim compensation for delayed flights and late trains, and even offer advice to refugees applying for asylum.

📍 donotpay.co.uk



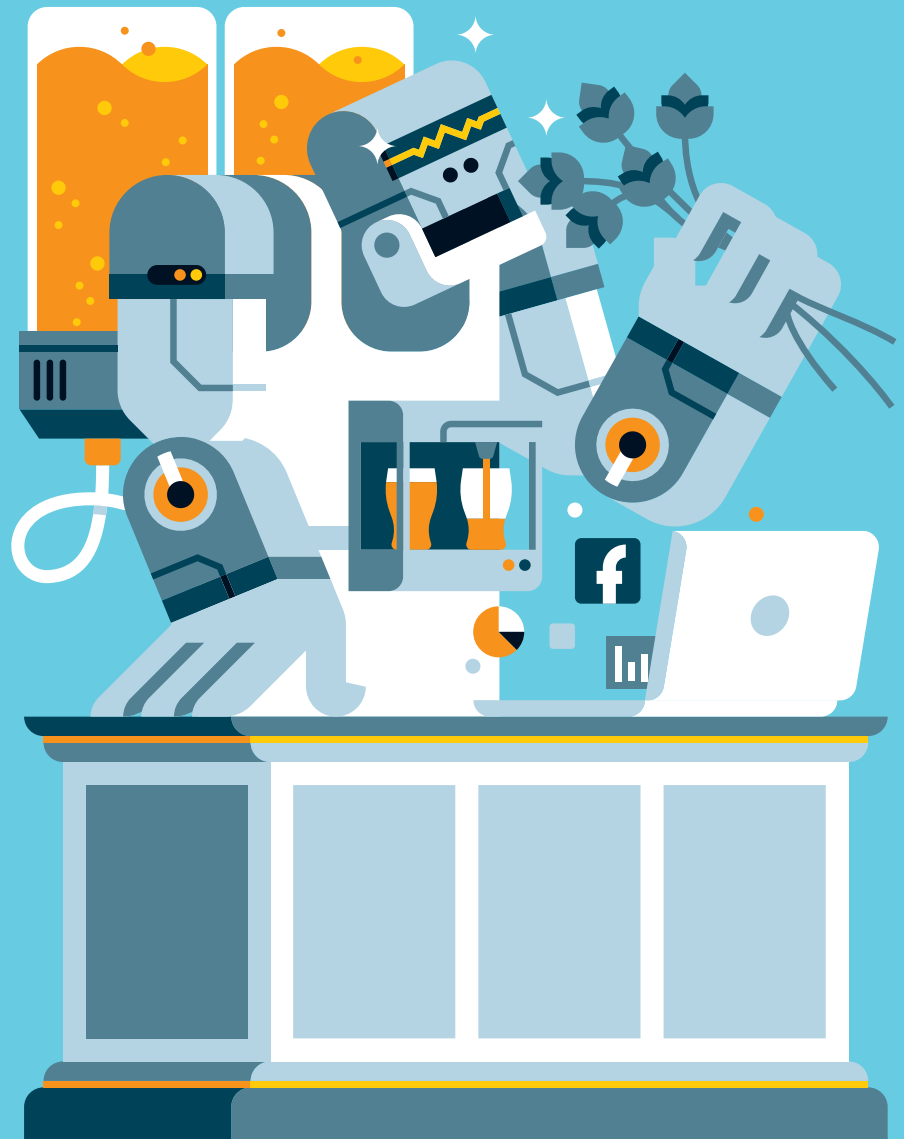
ARE MACHINES BECOMING SELF-AWARE?

Why generalised AI is “both the goal and the terror”

Anyone who has seen the *Terminator* films will understand the fear that machines will one day become fully conscious. At the moment, the AI we're familiar with is all ANI – artificial narrow intelligence – ie, confined to one specific area or task, such as self-driving cars, ticket-price algorithms or Twitter bots. However, scientists predict that computers could be capable of AGI (artificial general intelligence) or even ASI (artificial superintelligence) – becoming as smart or smarter than a human – as early as 2045.

“At the moment, AI is confined to isolated tasks, but AGI is where you'll get an AI that can generate learning in one context and apply it in another,” says innovation expert Lydia Nicholas. “That's both the goal and the terror.”

The main organisation pushing for AGI is Google's DeepMind – a London-based tech company that's been developing a set of powerful, general purpose, self-learning algorithms as the basis of a self-thinking AI agent. So far, the project has had only positive effects: its AlphaGo program used machine learning to beat a human at Chinese war game Go and it's partnered with the UK's National Health Service to help detect the onset of blindness, but no one knows what will happen if, or when, its aim is achieved. [deepmind.com](https://www.deepmind.com)



BREWING THE FUTURE

The millennia-old craft of brewing has been given a 21st-century makeover by a pair of London lads, who've created the world's first AI brewer. Entrepreneurs Hew Leith and Rob McInerney, who bonded at a coworking space over a shared love of beer, have created a brew called IntelligentX, which evolves its flavour based on response from social media.

“Essentially, we encoded the way humans brew beer by breaking the process down to its constituent parts and working out how each of these can be tweaked based on an exploit-explore model,” says Leith. “Consumers drink the beer and then communicate with a Facebook Messenger bot to give ratings on things like maltiness and hoppiness. The algorithm gets positive signals to exploit elements for which scores

are high.” To avoid bland brews, the algorithm incorporates the addition of ‘wildcard ingredients’. “Version six of Amber AI had grapefruit in it,” says Leith. “We thought it was crazy, but everyone loved it.”

As each new recipe for the IntelligentX beers is developed, old recipes are posted online for anyone – even competitors – to reproduce.

Now the pair plan to take their AI-brewed beer to Silicon Valley and then expand into other highly emotive consumer products, like chocolate, coffee and perfume. There will, however, always be a human element. “The future is algorithms augmenting human skills to make them better at their jobs,” says Leith. “So, our focus is on having man and machine working together the best way possible.”

intelligentx.ai



Tell me about your mother...

VIRTUAL SHRINKAGE

Those who confide their problems to people who don't exist are generally considered crazy, but with Ellie, a virtual psychotherapy assistant, they might actually be one step closer to being cured. Designed by scientists at the Institute for Creative Technologies (ICT) at the University of Southern California, Ellie can help diagnose signs of depression and post-traumatic stress disorder (PTSD).

She's not the first bot therapist – that accolade belongs to semi-intelligent chatbot ELIZA (a play on Doolittle), who was created by MIT professor Joseph Weizenbaum way back in the 1960s. Designed to mimic a Rogerian therapist, its repetitive, 'How does that make you feel?'

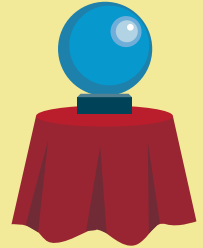
responses were more a highbrow joke about psychiatry than a useful tool.

In contrast, Ellie uses a sensor and webcam to detect subtle signs of distress in tone of voice and body language as well as speech.

Although she won't replace human therapists, she's an excellent first-response tool that can provide free assistance to overworked psychiatrists. She also reduces the stigma of therapy, according to co-creator Professor Louis-Philippe Morency. "People love talking to her.... [because] they don't feel judged," he says, comparing it to people talking to their dogs. "I think just talking with someone makes you feel better."

ict.usc.edu

Look into the future



Find out more about what the future holds at FutureFest, a weekend festival of talks and interactive performances held in London from 17-18 September. This year's guests include Brian Eno, DJ Spooky and influential gaming journalist Rhianna Pratchett.

futurefest.org

LOVE

According to a recent survey, 25% of 18-34 year olds would date a robot, if they looked like a human. At the festival, body technologist Ghislaine Boddington will explore what happens to romance when we move beyond the physical to merge with the virtual.

THRIVE

Ever wondered how the future will smell? Or how genetics might influence shopping habits?

Food futurologist Dr Morgaine Gaye has. Her talk will fast-forward to 2050, "focusing on scent, food, health and wellness" in a time when "thriving will be the watchword".

WORK

According to the Future Fest survey, 33% of

Brits say that they would be happy to have microchips implanted under their skin to open doors or log on at work. British inventor Ruth Amos delves into what will happen to our jobs as technology advances.