The robotic revolution of 'Industry 4.0' is upon us...

Robots are becoming cleverer and more adaptable, so humans will also need to evolve to survive in the jobs market, argues **Jeff Morgan**

Robots have been taking our jobs since the 1960s, so why are politicians and business leaders only now becoming so worried about robots causing mass unemployment?

It comes down to the question of what a robot really is. While science fiction has often portrayed robots as androids carrying out tasks in the much the same way as humans, the reality is that robots take much more specialised forms.

Traditional 20th-century robots were automated machines and robotic arms building cars in factories. These days, robots can be supermarket self-checkouts, automated guided warehouse vehicles, and even burger-flipping machines in fast-food restaurants.

Ultimately, humans haven't become completely redundant because, while these robots are very efficient, they're also quite dumb. They do not think, they just act, in very accurate but very limited ways. Humans are still needed to work around robots, doing the jobs the machines can't and fixing them when they go wrong.

This is all set to change thanks to a new wave of smarter, better-value machines that can adapt to multiple tasks. This change will be so significant that it could start a new industrial revolution.

This era of "Industry 4.0" will produce smarter robots with better sensing and communication abilities that can adapt to different tasks, and even co-ordinate their work to meet demand without the input of humans.

In the manufacturing industry, traditional robots have focused on single, fixed, high-speed operations and required a highly skilled human workforce to operate and maintain them. Industry 4.0 machines are flexible, collaborative and can operate more independently, which ultimately removes the need for the highly skilled workforce.

For large-scale manufacturers, Industry 4.0 means their robots will be able to sense their environment and communicate in a network that can be run and monitored remotely. Each machine will produce large amounts of information that can be collectively studied using what is known as "big data" analysis. This will help identify ways to improve operating performance and production quality across the whole plant, for example by better predicting when maintenance is needed and automatically scheduling it.

For small-to-medium manufacturing businesses, Industry 4.0 will make it cheaper to use robots that can be reconfigured to perform multiple jobs.

While these machines are getting smarter, they are still not as smart as us. Today's industrial artificial intelligence operates at a narrow level, which gives the appearance of human intelligence exhibited by machines, but designed by humans. What's coming next is known as "deep learning". Similar to big data analysis, it involves processing large quantities of information in real time to make decisions about what is the best action to take. The difference is that the machine learns from the data so it can improve its decision-making.

Exactly what impact a smarter robotic workforce with the potential to operate on its own will have on the manufacturing industry is still widely disputed. Artificial intelligence as we know it from science fiction is still in its infancy. It could well be the 22nd century before robots have the potential to make human labour obsolete by developing not just deep learning but true artificial understanding that mimics human thinking.

Ideally, Industry 4.0 will enable human workers to achieve more in their jobs by removing repetitive tasks.

In theory, this would allow humans to focus more on business development, creativity and science, which would be much harder for any robot to do.

Technology that has made humans redundant in the past has forced us to adapt, generally through more education.

But because the next generation of robots will be able to operate largely on their own, we might see much greater human redundancy from manufacturing jobs without other sectors being able to create enough new work. Then we might see political moves to protect human labour, such as taxing robots.

Again, in an ideal scenario, humans may be able to focus on doing the things that make us human, perhaps fuelled by a basic income generated from robotic work. Ultimately, it will be up to us to define whether the robotic workforce will work for us, with us, or against us.

Robot attendants may be serving up pizzas today, but what's next? AFP/GETTY

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