

Background Information

Read the following background information. As you read, use this information to develop an opinion on whether robots will be beneficial to or negatively affect the workforce.

The idea that robots will someday be versatile companions and co-workers has been a part of movies and books for a long, long time.

In the real world, computer software is already doing many tasks that humans used to perform. This process is called *software automation*. And when software automation is combined with physical devices, we get *robot automation*—although robots that look and behave like humans are still mostly fictional.

Software automation can conduct some legal tasks usually performed by legal assistants, compose simple financial articles usually written by journalists, and can even generate works of classical music. Robot automation is leading to the development of the self-driving car, which might someday reduce the need for truckers and taxi drivers. Many manufacturing companies also use robot “workers” as labor in factories. There are 250,000 robots in U.S. factories, and even more factory robots in Japan.

We’re at a stage where even greater improvements in robot design and *artificial intelligence* (AI) seem imminent. Stephen Hawking, a noted theoretical physicist, said he believed that by the year 2045, machines will be able to do most of the work that humans do—and maybe even *anything* that humans can do.

What will happen to human workers as robots and AI take on jobs that have traditionally been done by people?

Some people worry these new technologies will leave people without jobs, increasing the level of income inequality in society. Others argue that as machines take over these tasks, new jobs will be created for people.

In 2014, Pew Research questioned well-known technologists, researchers, and business leaders about these future developments. The key question in the survey was: *Will these technologies create or take over more jobs by 2025?*

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While respondents agreed that robots and AI could bring about big *changes* in the work force, they were pretty evenly split on the question of whether those changes will create or reduce the number or quality of human jobs.

Some people think that robots of the future will be mostly beneficial. An association representing the robotics industry and researchers estimates that automation will help create as many as 3.5 million jobs around the world by 2020. There are several arguments in favor of increased automation:

- Robots perform jobs that are “dirty, dull, and dangerous.” For example, “Packbot” has been used to investigate roadside bombs in war zones, so that people aren’t in danger. Another type of mobile robot works in hospitals, delivering supplies, meals, and even medications to patients. These robots may allow doctors, nurses, and other health-care professionals more time to interact with patients. Another robot can go into sewer pipes to check out problems. This robot operates in small spaces that most people wouldn’t *want* to visit, even if they could fit.
- Entirely new jobs could open up in traditional labor markets such as construction, manufacturing, and programming. If robots are needed for more jobs, those robots will need to be designed, built, programmed, and managed. And these are jobs that are still best done by humans.
- Jobs change, and people adjust. Centuries ago, the majority of people were farmers who only worked with hand tools. Then machines, such as tractors and combines, made this work much faster and easier, and today fewer people work in agriculture. Many people now work in jobs that didn’t even exist then, such as computer programming or machine manufacturing. The invention of the telephone opened up work for operators who would help complete calls, but then the technology advanced further and those operators weren’t needed anymore. In these cases, technology has been both a destroyer and creator of jobs.
- Robots will probably never be good at some jobs. Given that hardware automation is developing much more slowly than software automation, we have time to learn from the challenges automation presents, and adapt our education and social systems accordingly.
- In the United States, increased automation may slow the loss of jobs to overseas markets. If these jobs are taken over by robots that can do the work more efficiently, manufacturers may be convinced to keep their factories in the U.S.
- With robots taking over jobs that are repetitive, people could be freed up to pursue more satisfying work. Some areas of work would likely remain protected, including those that require creativity, strategic thinking, management, diagnosing, and human interaction. These are fields where closely interacting with and caring for other people are essential, and they are also things that robots are not very good at doing.

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Critics of automation are less optimistic about the potential for robot work. They remain concerned that this process will negatively disrupt the human work force:

- Robots may automate so many fields, in such a short amount of time, that only a few elite careers will remain. In manufacturing, robots work with incredible precision and power, and although they require maintenance, they don't get tired. Humans can't hope to compete against them in these tasks.
- If the changes caused by automation come too quickly, people won't be able to adjust and the result will be mass unemployment and social disruption. People would have to compete for a few remaining jobs. The supply of labor could exceed demand, and wages could fall.
- Traditionally, younger workers start out doing simple tasks in order to gain skills. If robots take on these roles, entry-level workers won't be able to learn and employers might have no one skilled enough to take on more responsibilities.
- Schools may not currently be equipped to prepare students for the future of work. Some critics say that the current American school system is set up to train the next generation for 20th-century factory jobs—and these jobs are largely gone. We aren't even sure which jobs robots could take, making it difficult to create a school system that can prepare students for this future labor market.

So far, robots have functioned mostly as *tools* that perform a limited set of tasks. Even though a computer has beaten one of the world's best chess players, the best scientists have taken decades to get robots to climb a flight of stairs, or even to tie a simple knot in a piece of rope.

But rapid advancements could eventually make robots part of our everyday lives. If we are on the verge of a highly accelerated pace of advancement in artificial intelligence—and if this combines with physical machines to make highly intelligent robots—it's important to figure out ahead of time: How might robots change the workplace of the future? And what kinds of skills will we need to adapt and adjust?