

# **Are Robots Really Coming for Our Jobs? How Automation and AI Will Affect the Future of Work**

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The Fourth Industrial Revolution is upon us. While some fear that automation and artificial intelligence (AI) will bring massive unemployment, others celebrate new frontiers and new opportunities for workers and businesses alike.

In 2018, the World Economic Forum reported on a range of recent robotics technologies at or near commercialization, including stationary robots, non-humanoid land robots, and fully automated aerial drones, each of which has significant potential to displace thousands or even millions of jobs across

industries and job sectors. The report also states that up to 37% of surveyed companies are likely or very likely to expand their investment in and adoption of advanced robotics by 2022.

Until recently, automation and AI displaced routine tasks that were predictable and could be easily programmed, such as assembly line robots in factories and computer programs that replaced switchboard operators. However, the machines and smart-thinking systems on the horizon have far greater potential to mimic nonroutine manual and cognitive tasks that could only be performed by humans in the past.

For example, The Brookings Institution states that artificial intelligence is expected to be better equipped than humans to:

- ▶ Write a high school essay by 2026
- ▶ Write a best-selling book by 2049
- ▶ Perform surgery by 2053

What's more, there is a 50% chance that AI will outperform all human tasks in 45 years and automate all human jobs in 120 years.

In the coming chapters, we take a closer look at the impacts expected to be felt throughout the workforce as a result of automation and artificial intelligence, the people and places most likely to feel the effects of these changes, and how workers of today can “future-proof” themselves to survive the wave of technological innovation coming to workplaces.





## Chapter 1

# Jobs Lost/ Gained/ Changed

### ► Jobs Lost Due to Automation and AI

A survey by [ZipRecruiter](#) found that one in five job seekers (one in three for those between the ages of 18 and 22) fear they will one day lose a job to AI. However, if other research is any indication of the job displacement looming on the horizon, the ZipRecruiter survey shows that people are not as concerned as they should be.

In “[The Future of Employment: How Susceptible Are Jobs to Computerisation?](#)” Carl Frey and Michael Osborne at the University of Oxford suggest that 47% of total U.S. employment—

today is in occupations at high risk for automation. Similarly, 50% of U.S. executives surveyed by the [Boston Consulting Group](#) in 2019 stated that they expect a reduction in the number of employees over the next five years due to advanced robotics. Other estimates of job losses on the horizon include:

- 9.1 million U.S. jobs destroyed by 2021 ([Forrester](#))
- 58.2 million U.S. jobs destroyed by 2030 ([PWC](#))
- 80 million U.S. jobs destroyed by 2035 ([Bank of England](#))

However large the actual numbers are, job losses due to automation and artificial intelligence will not necessarily cause sudden mass unemployment. Instead, many occupations are likely to shrink over time through attrition and reduced hiring.

Consider office support roles, for example: administrative assistants, bill collectors, and bookkeepers lost a combined 226,000 jobs from 2012 to 2017, according to [McKinsey](#). As technologies such as data analytics, cloud computing, and the Internet of Things helped maximize worker efficiency and productivity, companies found that they could do more with less and so, the demand for office support specialists fell.



## ► Jobs Gained Due to Automation and AI

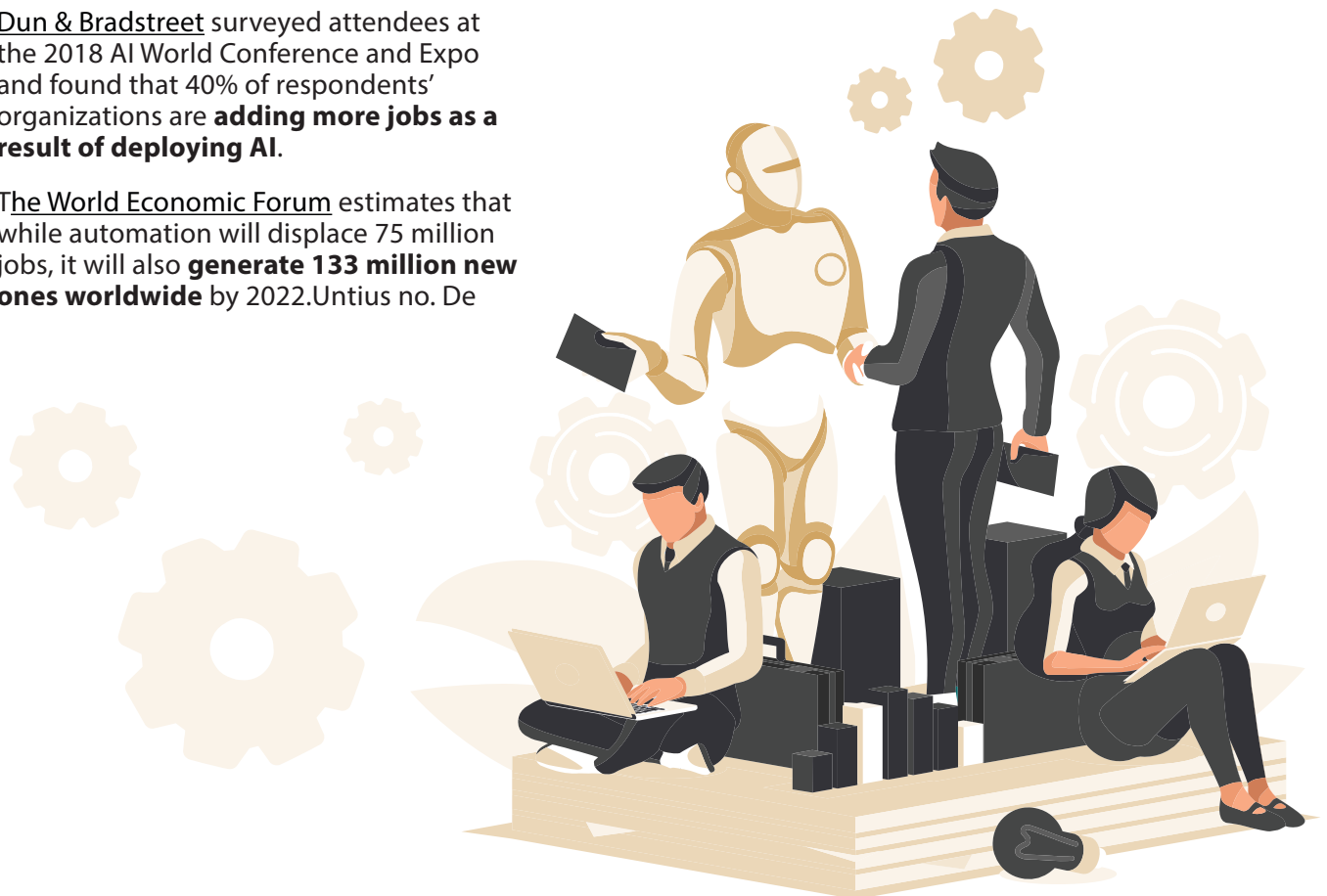
Many experts argue against the idea that automation and artificial intelligence will be cataclysmic for the global workforce. On the contrary, economists and futurists are actually optimistic about workers' prospects in the future because of automation and AI.

In fact, many of the studies and reports on the dramatic number of job losses in the near future due to technological advancements pale in comparison to the number of jobs expected to be created due to the very same technologies. Consider some of the following research:

- ZipRecruiter mined data from more than 50 million job postings and found that artificial intelligence **created three times as many jobs** as it destroyed in 2018.
- Dun & Bradstreet surveyed attendees at the 2018 AI World Conference and Expo and found that 40% of respondents' organizations are **adding more jobs as a result of deploying AI**.
- The World Economic Forum estimates that while automation will displace 75 million jobs, it will also **generate 133 million new ones worldwide** by 2022. Untius no. De

Consider the personal computer and the automobile. Computers and cars collectively destroyed millions of jobs, but in both cases the new technologies enabled the creation of significantly more jobs than they eliminated.

- McKinsey estimates that computers have enabled the creation of over 19 million jobs since 1970—about 10% of the labor force today—compared to 3.5 million identifiable jobs destroyed by the introduction of computers.
- In the case of the automobile, McKinsey estimates 623,000 jobs destroyed to more than 7.5 million jobs created, such as truck drivers and automobile mechanics.





Workers anxious about losing their jobs to robots or artificial intelligence can look to some of the emerging roles that are expected to grow in the near future thanks to technological advancements. For example, the [World Economic Forum](#) reports these top 10 emerging roles by 2022:

- ▶ Data analysts and data scientists
- ▶ AI and machine learning specialists
- ▶ General and operations managers
- ▶ Software and applications developers and analysts
- ▶ Sales and marketing professionals
- ▶ Big data specialists
- ▶ Digital transformation specialists
- ▶ New technology specialists
- ▶ Organizational development specialists
- ▶ Information technology services professionals

## ▶ Jobs Changed Due to Automation and AI

According to [McKinsey](#), within 60% of jobs, at least 30% of activities could be automated by adapting currently demonstrated technologies.

In many workplaces, traditional job roles and responsibilities will change as machines increasingly handle routine physical and cognitive tasks, and as humans learn to work alongside machines. Consider how the job requirements of teachers, secretaries, and other professionals have changed due to computers automating manual tasks such as basic data collection and processing.

Boston University economist James Bessen highlights another example of how technology has changed the nature of work without necessarily displacing the very workers who used it: the ATM.



Bessen describes how the job description of a bank teller adapted when much of their routine work was replaced by ATMs.

*“As banks pushed to increase their market shares,” Bessen writes, “tellers became an important part of the relationship banking team... The skills of the teller changed: cash handling became less important and human interaction more important.”*

Unfortunately, calamitous warnings of job losses due to automation and AI overshadow the benefit of human-machine collaboration. According to [Accenture](#), if companies were to invest in AI and human-machine collaboration at the same level as the top-performing companies, they could lift employment levels by 10% by 2022 (or about 5,000 jobs for an S&P 500 company).







## Chapter 2

# People, Professions, and Places at Risk

While automation and AI will change the nature of work for us all, certain people in certain professions in certain areas of the United States are expected to bear the brunt of adjustment costs of large-scale adoption of robots, data analytics, cloud computing, etc.

Research indicates that there are two primary personal indicators of being displaced in the workforce of the future: education level and skill set.

- ▶ In terms of education, McKinsey estimates that individuals with a high school degree or less are four times more likely to be in a highly automatable role than individuals with a bachelor's degree—and as much as 14 times more vulnerable than someone with a graduate degree—and account for 78% of the overall displacement (i.e., potential job losses).

- ▶ The other predictor, skill set, is an indication of which skills are most likely to be automated by robotics or performed by artificial intelligence in the future.

Using data from the U.S. Department of Labor for 800 occupations, McKinsey identified 2,000 distinct work activities and determined the potential for existing technology to substitute for humans across different performance capabilities. Work activity categories with the highest potential for automation include:

- ▶ Performing physical activities
- ▶ Operating machinery in predictable environments
- ▶ Processing and collecting data

People whose primary work skills fall under these categories are at a higher risk of being displaced by automation and AI than individuals engaged in work activities with low automation potential.

### Automation Potential by Work Activity Category

Work Activity Category	Automation Potential
Managing and developing people	9%
Applying expertise to decision-making, planning, and creative tasks	18%
Interfacing with stakeholders	20%
Performing physical activities/operating machinery (unpredictable environments)	26%
Collecting data	64%
Processing data	69%
Performing physical activities/operating machinery (predictable environments)	81%

Source: [McKinsey](#)

In terms of the occupational categories that are most at risk, researchers at the [University of Oxford](#), working with machine-learning experts, applied a classification algorithm to over 700 different occupations to determine which jobs are the most automatable. Their results suggest that close to half (47%) of total U.S. employment is in occupations at high risk for automation, compared to about one-third (33%) in occupations at low risk.



According to the study, occupational categories at high and low risk for automation include:

### Categories of Occupations at High and Low Risk for Automation

High Risk	Low Risk
<ul style="list-style-type: none"> <li>• <b>Service</b></li> <li>• <b>Sales and related</b></li> <li>• <b>Office and administrative support</b></li> <li>• <b>Production</b></li> <li>• <b>Transportation and material moving</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Management, business, and financial</b></li> <li>• <b>Computer, engineering, and science</b></li> <li>• <b>Education, legal, community service, arts, and media</b></li> <li>• <b>Health care practitioners and technical</b></li> </ul>

Source: Oxford Study, Frey and Osborne

Unfortunately, the wave of technological innovation coming to America will play out differently in cities and local communities across the United States. Cities at high automation risk tend to have a large workforce employed in industries such as service, sales, office support, and manufacturing.

A study by the University of Oxford and Citi found that Fresno, California, and Las Vegas had the highest shares of employment at risk of automation (53.8% and 49.1%, respectively). McKinsey performed a more in-depth geographical analysis of the future of work in America and identified 512 U.S. counties, home to approximately 20.3 million people, where more than 25% of workers could be displaced.

The majority of counties at high risk of job loss due to automation and AI are concentrated in low-growth rural areas, which as a group account for 20% of jobs today but could see as little as 3% job growth through 2030, if any job growth is experienced at all.

The McKinsey study found that the “urban core” (comprised of megacities like New York and high-growth hubs like Seattle) may account for 60% of net job growth by 2030, followed by the “mixed middle” (e.g., Detroit; Providence, Rhode Island; and Greensboro, North Carolina) with 28% and “niche cities” (e.g., Provo, Utah; Prescott, Arizona; and South Bend, Indiana) with 8%.

## Employment Growth by 2030

Category	Urban Segments	Examples
<b>Urban Core</b> <ul style="list-style-type: none"> <li>Share of 2017 employment: 44%</li> <li>Share of 2017–2030 employment growth: 60%</li> </ul>	Megacities (74.3M people)	New York San Francisco
	High-Growth Hubs (21.6M people)	Seattle Austin, Texas
<b>Niche Cities</b> <ul style="list-style-type: none"> <li>Share of 2017 employment: 5%</li> <li>Share of 2017–2030 employment growth: 8%</li> </ul>	Small Powerhouses (5.0M people)	Provo, Utah Reno, Nevada
	Silver Cities (8.8M people)	The Villages, Florida Prescott, Arizona
	College-Centric Towns (6.1M people)	Chapel Hill, North Carolina South Bend, Indiana
<b>Mixed Middle</b> <ul style="list-style-type: none"> <li>Share of 2017 employment: 30%</li> <li>Share of 2017–2030 employment growth: 28%</li> </ul>	Stable Cities (39.3M people)	Detroit Columbus, Ohio
	Independent Economies (26.0M people)	Little Rock, Arkansas Providence, Rhode Island
	America's Makers (11.2M people)	Grand Rapids, Michigan Greensboro, North Carolina
<b>Low-Growth and Rural Areas</b> <ul style="list-style-type: none"> <li>Share of 2017 employment: 20%</li> <li>Share of 2017–2030 employment growth: 3%</li> </ul>	Trailing Cities (14.8M people)	Bridgeport, Connecticut Flint, Michigan
	Americana (44.0M people)	Cameron, Texas Caddo Parish, Louisiana
	Distressed Americana (18.1M people)	Coahoma, Mississippi Danville, Virginia
	Rural Outliers (1.5M people)	Kauai County, Hawaii Juneau Borough, Alaska

Source: McKinsey, *The Future of Work in America*

[\\*Click here for a full list of US cities and counties](#)



## Chapter 3

### How to 'Future-Proof' Yourself

There is little anyone can do to stop the robots and AI systems that will soon be in the workplace. The best hope workers have is to adopt the mindset that change is inevitable and take necessary steps to acquire the knowledge, skills, and attributes the future of work demands.

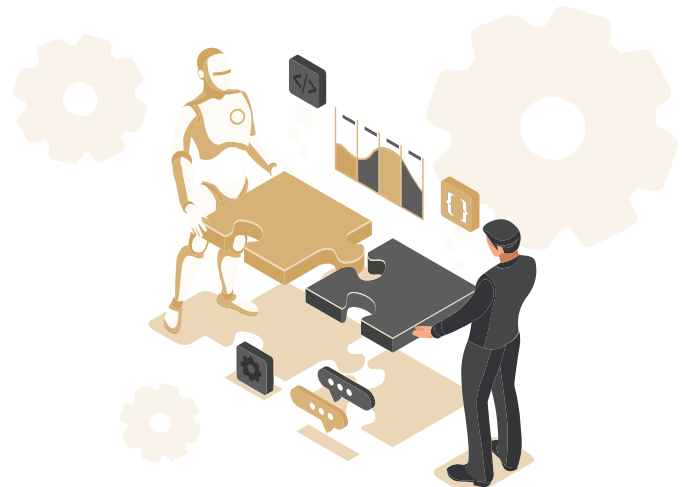
Workers who possess skills that are complementary to new technologies may even benefit from automation by reaping most of the productivity increases in the form of higher wages, according to [Daniele Tavani](#), associate professor in the Department of Economics at Colorado State University.

Something that may help anxious workers feel more confident about their role in the future workforce is the fact that even with the productivity gains made possible by advanced robotics and intelligent software, humans are still more valuable than their technological successors.

The [Centre for Economic and Business Research](#), a leading British economic consultancy, reviewed the financial contribution workers make toward the economy and compared it with other assets. The Centre found:

- ▶ Human capital—people, labor, and knowledge—will be worth as much as \$1.2 quadrillion over the next five years.
- ▶ In contrast, physical capital will be worth an estimated \$521 trillion.

In short, human talent and intelligence is 2.33 times more valuable to an organization than everything else put together, including inventory, real estate, and yes, even technology.





## ► The Key to Maximizing Your Value in the Future Workforce Is to Become a Learner for Life

In Darrell West's book, "The Future of Work: Robotics, AI, and Automation," the author recommends moving toward lifetime learning and training as a solution to the workforce disruption created by automation and artificial intelligence.

The old model of front-loading education early in life must give way to lifelong learning, in which skilled and unskilled workers alike accept that career growth is dependent on continuously learning new skills.

By 2022, The World Economic Forum expects no less than 54% of all employees will require "significant retraining and upskilling" (10% of employees will require additional skills training lasting more than a year). Experts anticipate the fastest rise in the need for advanced IT and programming skills, which could grow as much as 90% between 2016 and 2030, according to McKinsey.

For older adults with experience in highly automatable fields, there may be opportunities to learn new skills that can be applied to improve one's prospects in an occupation where adoption of robotics and/or artificial intelligence is growing.

"Consider truck drivers," says Robert Kayl, faculty, School of Business and Information Technology at Purdue University Global. "Think of how much software and hardware needs to be developed for a truck to drive on its own, and it's in an area that drivers have knowledge in. So, if they could apply their knowledge gained as drivers behind the wheel with software capabilities, just think about how much better they would be than software engineers who have no clue what it's like to actually drive a truck."



## ► Prepare Today for the Workforce of Tomorrow With Purdue Global

Even as automation and artificial intelligence take jobs in the future, countless more opportunities will exist for those who have the skills necessary to interface and collaborate with new technology. Purdue Global can help you acquire those skills.<sup>1</sup> “I’ve taught at different schools for over 23 years,” says Kayl, “and the thing I see Purdue University Global doing better than anywhere else I’ve taught is providing competencies beyond technology. Graduates are prepared with the soft skills and technical skills the workforce of today—and tomorrow—demands.

*“Purdue Global has pioneered the use of seminars for online learners, in which instructors like myself go over the material and field questions from students through video. That’s not something all other online classes or schools do,” Kayl says. “Other schools I’ve taught for didn’t do that, and I think that’s a big weakness compared to Purdue Global.”*



Purdue Global offers more than 175 online programs including bachelor's and master's degrees in business and information technology. Our faculty are experts who help you develop real-world skills that prepare you for success in the automated and intelligent workforce of the future. [Request more information today.](#)

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- 1 Purdue Global cannot ensure employment or career advancement. Additional certification or licensing may be required to work in certain fields.

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