



North American Robotics Growing, but Faces Global Challenges

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NORTH AMERICAN ROBOTICS GROWING, BUT FACES GLOBAL CHALLENGES

The U.S. is a major developer and user of all kinds of robots, Mexico is a go-to location for manufacturing, and Canada is specializing in AI research. Competitive concerns are helping automation grow across the continent.

By Jim Romeo

THE U.S. POSITION IN THE GLOBAL ROBOTICS MARKET

The U.S. is a leading producer and user of industrial automation equipment, broadly defined as hardware and components in manufacturing or industrial settings, according to the International Trade Association.

The global market for industrial automation is being driven by two factors — the need to improve productivity and the need to reduce operational costs — said the association in its [2016 outlook](#).

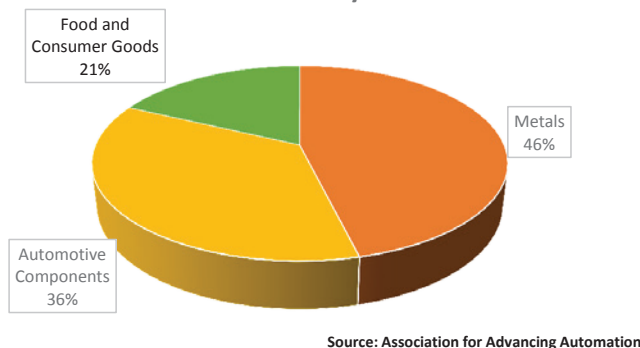
In North America, as in other regions, wage pressures, technical improvements, and trade policies have driven the growing demand for robotics. In the U.S., manufacturing and supply chain operations have benefited from cheaper sensors, improving control technology, and widening availability of mobile and [collaborative robots](#).

Last year, the North American automation market [set new records](#) in the areas of robotics, machine vision, motion control, and motor technology, found the Association for Advancing Automation (A3).

In the [first half of 2017](#), 27,294 orders for robots valued at approximately \$1.47 billion were made, the highest level ever recorded for that time period in any year. That's a 14% increase in units sold, and 10% in dollar value above the 2016 levels.

Automotive, aerospace, and electronics manufacturers are still adding robots to their operations. According to A3, automotive-related orders were up 11% in units and 10% in dollars, while non-automotive orders were up 20% in units and 11% in dollars from the previous year's levels.

**What Industries Generated the Most Demand for
Robotics in Early 2017?**





In the medium to long term, demand for efficiency in manufacturing and fast e-commerce order fulfillment will continue to help U.S. robotics suppliers and users. Although the “big four” industrial automation suppliers — ABB, FANUC, [KUKA](#), and Yaskawa — are based outside of North America, the [U.S. continues to be](#) a major buyer of all kinds of robots and a leading technology innovator.

Companies such as Boston Dynamics, iRobot, Rethink Robotics, and Rockwell Automation are highly visible U.S. robotics firms, not to mention self-driving car pioneers Tesla and Waymo. In addition, Amazon, Facebook, and Google are leaders in artificial intelligence.

Industry observers predict that the generation of big data and progress in machine learning will lead to more applications for the Industrial Internet of Things (IIoT) and AI (in the broad sense).

For both hardware robots and software-based automation, the U.S. remains competitive, even without a unified economic [strategy for smart manufacturing](#). That’s because of defense and research spending; universities including MIT, Stamford, and Carnegie Mellon; investors willing to take risks on innovation; and established user verticals.

U.S. ROBOTICS GROWS, REGARDLESS OF NAFTA

In 1994, the North American Free Trade Agreement (NAFTA) created a trading block that resembled a patchwork quilt composed of the economic muscle of Canada, Mexico, and the U.S. This changed the face of North American trade and led to some controversy over the years.



Today, the fate of that agreement is [uncertain](#). However, with the growth of industrial automation, as well as that of AI, additive manufacturing, and unmanned systems, today's concerns are as much about worker displacement and [retraining](#) as they are about international trade. Although official U.S. unemployment is low, [fears of offshoring production](#) continue to motivate industrial policies.

MEXICO'S STRONG BED OF MANUFACTURING AND AUTOMATION

Many U.S. and global companies still look to Mexico as a good place to break ground and put up a factory. As a nation of some 120 million inhabitants, Mexico continues to enjoy the facility of importing and exporting that NAFTA has afforded.

Unbeknownst to many, Mexico is the 11th largest world economy, featuring a diverse range of manufacturers. Just three years ago, robot sales there almost tripled to 6,320 units, exceeding \$243 million, [said A3](#), which recently launched a chapter in Mexico.

The rise of automation only strengthens the case for manufacturing in Mexico. Numerous U.S. manufacturers have migrated their operations to Mexico, anticipating lower wages. The movement of work to Mexico has also stirred resentment in U.S. workers affected.

Robotics has helped shape Mexico as a [manufacturing site](#), prepared with willing and inexpensive workers, close to many American states that buy and consume the products once produced within the U.S.



PROMISES OF PROSPERITY

The recent election of Mexico's new president, Andrés Manuel López Obrador, a leftist voted in with wide populist support, has created [some uncertainty](#) as to how he will influence and steer the country with regard to manufacturing jobs, their industrial health, and nation-to-nation relationships.

He made strong promises to bring prosperity as a manufacturing hub for many foreign companies. How his election will shape the future of industrialization and automation in Mexico remains to be seen.

CANADA NURTURES AI TALENT POOL, BUT NEEDS TO INVEST MORE

Canada has worked to become a hub for high technology, combining [automation for manufacturing](#) productivity with an [emphasis on AI](#) research and development.

Like their American cousins, Canadians are wary of the potential impact of robotics and AI on their labor force. The country has embraced digitization, IoT, and worker retraining as ways to build smart manufacturing and shift factory workers to knowledge workers.

To this end, the [Canadian government](#) is offering grants and loans to encourage existing workers and unemployed residents to go back to school on a part-time basis to learn new skills. It hopes that they will ultimately apply those skills in new jobs.

Canada's efforts represent a best practice for building a culture of curiosity and retraining that can embrace the fruits of automation instead of fearing it.

Last year, Canadian Prime Minister Justin Trudeau announced that Canada would invest about \$125 million to “attract and retain top academic talent in Canada.” The government [said this initiative](#) is intended to “cement Canada’s position as a world leader in AI.”

In fact, Canada has worked hard to [establish its AI quotient](#) in academia at institutions such as the University of Montreal and McGill University. [Toronto is also being promoted](#) as an AI hub.

CALL FOR MORE CANADIAN MANUFACTURING INVESTMENT

However, some believe the efforts for manufacturing overall are not enough. In 2017, Canadian Manufactures & Exporters (CME) advocated for more government support. [Its report](#), “Accelerating Adoption of Advanced Manufacturing,” recommended more investments in innovative technologies, which it said are lacking.

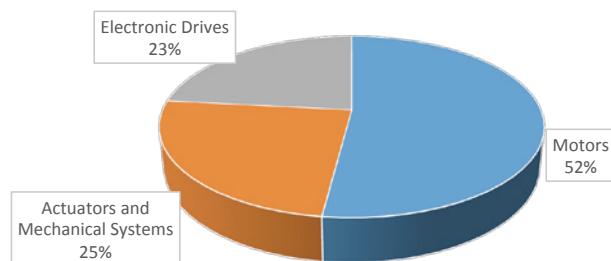
“For manufacturers to compete globally, they must invest in new advanced technologies, both in their products and their processes,” stated Mathew Wilson, senior vice president at CME. “For the Canadian economy and the manufacturing sector to prosper, companies must invest in new machinery and equipment, and incorporate new digital technologies and advanced manufacturing capabilities into their operations. However, over the past several years, investment has decreased as the sector has struggled with static output and exports.”

When CME surveyed manufacturing stakeholders, it found that 60% do not presently use advanced manufacturing technologies in their operations.

It recommended, among many things, the establishment of manufacturing hubs and demonstration centers to showcase and test new technologies.

“The Fourth Industrial Revolution is rapidly changing the products that manufacturers are creating and how they are being created while reducing operating costs and improving environmental performance,” added Wilson. “Other countries

Which automation components lead in shipments in 2017?



Source: Association for Advancing Automation

have created national strategies around technology adoption, and it is critical that Canadian governments work closely with industry to help facilitate the adoption of these technologies and to grow our manufacturing sector. Without strong, coordinated actions, our manufacturing sector will continue to be left behind.”

“Regions that are quickly adopting cognitive technologies, such as robotics and AI, are those that have established funding (internally or externally sourced), along with a workforce that can develop, implement, and maintain new technologies,” said PR Krishnan, global head of enterprise intelligence automation at Tata Consultancy Services (TCS). “We also see a strong correlation between academic focus on AI-related research and courses and encouragement of the start-up ecosystem, which play a part in U.S., Canada, the U.K., and Sweden leading the pack.”

A BROADER WORLDVIEW

Last year, TCS surveyed more than 800 executives across North America, Europe, Latin America, and the Asia-Pacific Region about smart technologies. In [its report](#), “Getting Smarter by the Sector,” TCS found that 84% of companies said that they are already using AI.

A majority, or 62%, said they view the technology as being “important” or “highly important” to staying competitive.

Interestingly, Latin American firms ranked the importance of cognitive technologies to competitiveness higher than those from the other regions. The study also found that North American and European companies are the biggest AI spenders, followed by Asian-Pacific and Latin American ones.

Unsurprisingly, TCS reported a strong correlation between company size and spending on machine learning. For example, companies with a revenue of \$50 billion or more averaged \$289 million in investment. Firms with revenue between \$100 million and \$1 billion averaged only \$16 million in spend per company.

Of the companies surveyed, most that spent more than \$250 million on these technologies are based in North America -- think Amazon, Facebook, or Microsoft -- followed by those in Europe, Asia-Pacific, and Latin America.

South Korea, Germany, and Singapore are the world’s top-ranked nations for smoothly integrating intelligent automation into their economies, according to ABB and The Economist Intelligence Unit. Their report, “[The Automation Readiness Index \(ARI\): Who Is Ready for the Coming Wave of Innovation?](#)” recommends adopting policies to ensure that the rapid adoption of these

new technologies will not leave people unprepared for the new, more human-oriented jobs that will be needed as robots and algorithms take on more-routine tasks.

“The pace of innovation and job change today is so fast that everyone must have access to lifelong learning,” said Ulrich Spiesshofer, CEO of ABB. “Augmenting human potential with technology, in a responsible way, while providing ongoing education and training, is an opportunity to drive prosperity and growth.”

At the same time, [countries are just beginning](#) to come to grips with the opportunities and challenges posed by automation. *The Economist* and ABB’s report notes that “more engagement between government, industry, educational specialists, and other stakeholders is needed if policymaking is to keep pace with innovation in automation.”

ASIAN COUNTRIES AT THE FOREFRONT

In North America, the U.S. has the highest robot density, at about 190 robots per 10,000 human workers, [according to the International Federation of Robotics](#) (IFR). That’s behind South Korea, Singapore, Germany, Japan, Sweden, and Denmark, but ahead of China.

On the other hand, China’s robot density has grown from 25 robots per 10,000 workers to 68 units in 2016. In comparison, Canada has a robot density of 145 robots per 10,000 employees, and Mexico’s robot density is below the global average at 33. Those numbers are likely to grow in the near future. Hardware robots are just part of the global competition picture, with [an AI race](#) now under way.

“Investments in AI globally are still skyrocketing,” said Frank Palermo, executive vice president, digital, at the global IT services company Virtusa. “By the end of 2018, the global AI market is expected to be worth approximately \$7.35 billion. However, the AI market is maturing, and funding has now shifted to mid- and late-stage companies and less to seed funding. Investors are now looking for more mature, well-established AI companies.”

IN EUROPE, ALL EYES ON GERMANY?

Germany is Europe’s most automated country, ranking third worldwide with 309 robots per 10,000 workers. The IFR says that between 2018 and 2020, the annual supply in Germany will continue to grow by at least 5% on average per year due to the increasing demand for robots in all industries, particularly



Source: KUKA AG

**Germany’s
KUKA is a
leading provider
of industrial
automation.**

automotive.

According to IFR, European Union members such as Sweden, Denmark, Italy, and Spain have a much higher degree of automation than, say, the U.K. or France. In Eastern Europe, robotics is strong in Slovenia, Slovakia, and the Czech Republic are also strong because automotive demand.

AI AS A STRATEGIC ADVANTAGE

As robots become more sophisticated, mobile, and collaborative, they are entering new markets beyond manufacturing, including healthcare, transportation, and the [service industry](#). In North America and Europe, the primary concern around automation and AI has been about worker displacement and privacy.

“As AI takes a more prevalent role in our society, the issue of ethics and governance becomes critical,” said Virtusa’s Palermo. “How do you bridge the gap between man and machine? Policymakers around the globe have a responsibility to be forward-thinking with respect to how to regulate AI in a way that allows the technology to reach its full potential without having a negative impact on humans and society.”

“Automation solutions are typically applied to routine, repetitive, human-assisted tasks, and they often deliver 20% to 30% cost savings, based on our experience working with banking organizations,” he explained. “Now organizations are moving further along the maturity curve, since these task-level solutions have performed well and are now moving toward enterprise-wide automation.”

“Countries that master AI first will have a crucial strategic advantage in writing the rules for the next global order,” Palermo said. “That’s why investing in AI is becoming a major initiative for both emerging and well-established economies.”

AUTOMATION AND TARIFFS

Regional economics doesn’t just depend on the advance of robotics and AI; it also is subject to political shifts. The U.S., long a proponent of reducing global trade barriers, is among the countries now leading debate in favor of tariffs in response to imbalances.

In *USA Today*, Penny Pritzker, former U.S. secretary of commerce, and John Engler, former governor of Michigan, [wrote an op-ed](#) saying that trade wars shouldn’t be the U.S. government’s primary concern. The two former officials



are co-chairs of an independent task force sponsored by the Council on Foreign Relations on the future of the U.S. workforce

Pritzker and Engler argued that automation has rapidly affected the global industrial base. Pritzker cited a Council on Foreign Relations report noting that governments, businesses, and educational institutions have lagged in providing workers with the skills they need to compete in global marketplace. Automation is where the attention should be placed, rather than protective tariffs, the co-authors said.

“The crucial task facing the United States is to rebuild the links among work, opportunity, and economic security in the face of accelerating technological change and global competition,” Pritzker said. “Continued failure to address this challenge will amplify the pressures for retrenchment that are causing our country to back away from its historic global leadership.”

Pritzker cited a [McKinsey report](#), “Jobs Lost, Jobs Gained: Workforce Transitions In a Time of Automation,” which stated: “Automation technologies, including artificial intelligence and robotics, will generate significant benefits for users, businesses, and economies, lifting productivity and economic growth. The extent to which these technologies displace workers will depend on the pace of their development and adoption, economic growth, and growth in demand for work. Even as it causes declines in some occupations, automation will change many more — 60% of occupations have at least 30% of constituent work activities that could be automated. It will also create new occupations that do not exist today, much as technologies of the past have done.”

One possible result of increased tariffs is that domestic demand for U.S. goods could increase, as long as they are produced at a competitive price. Robotics and AI could help U.S. manufacturers.

Companies that rely on export revenues will need to reduce their production costs to make up for increased tariffs. Automation could also help these companies.

MANUFACTURERS REACT TO TARIFFS

Despite this optimism, other industry observers are concerned that tariffs on goods and services from Canada and Mexico could increase prices, accelerate automation and competitiveness in those countries, and affect U.S. access to materials and markets.

The National Association of Manufacturers (NAM) has praised White House efforts to curtail unfair trade practices.

“For too long, China has reaped the rewards of unfair trade practices and intellectual property theft, exploiting loopholes in decades-old agreements,” [stated NAM](#). “In the absence of a modern, enforceable agreement, China cheats.”

“Manufacturers want to see the administration get China back to the negotiating table as soon as possible in order to pursue a trade agreement that will redefine the U.S.-China economic relationship for the better,” said the association. “We now have an unparalleled opportunity to stop these practices at their root, through a strategic approach that includes the negotiation of a fair, bilateral, enforceable, rules-based trade agreement by an administration that champions manufacturing.

However, NAM was quite clear in adding that tariffs are not a solution and could cause a much-feared trade war.

“Tariffs, though, have not and will not solve the existing problems in China. Tariffs will bring retaliation and possibly more tariffs,” NAM said. “No one wins in a trade war, and it is America’s manufacturing workers and working families who will bear the brunt of continued tariffs. Manufacturers in the United States succeed when the rules are clear and fair and markets are open. The United States has China’s attention, and we must seize the moment and soon.”

Other organizations have expressed discontent with U.S. tariff policies. Early this year, The Precision Machined Products Association (PMPA) expressed disappointment with the U.S. Department of Commerce after it announced tariffs on aluminum and steel.

“Despite averaging roughly 35 employees, the typical PMPA member spends



*Automakers and their suppliers are still major robotics users in North America.
Source: FANUC*

\$2.3 million annually on steel, meaning a 53% tariff would cost each of our American businesses over \$1.2 million, an untenable situation,” [said Miles Free](#), director of industry research and technology at PMPA.

He noted that such price increases could be especially difficult for small, downstream manufacturers.

Not only could tariffs affect the supply of raw materials and the demand for manufactured goods in North America, but they could also affect the [location of production](#) and new markets for robots worldwide.

While many scorn the proposed tariffs, they might provide a timely opportunity for automation suppliers to grow. Manufacturers that have considered modernizing their production could well be willing to invest in robotics. The same could be true of enterprise services and AI.

Companies that have already adopted automation could use tariffs as a driver for increasing productivity, but they will still need to get their goods and services to desirable markets.

Many industry analysts agree that automation in North America is likely to continue growing, regardless of tariffs or macroeconomic cycles of expansion and contraction. Today’s low unemployment has created demand — particularly in agriculture, supply chain, and [construction](#) — that robots can help satisfy.

About the Author:

[Jim Romeo](#) is a journalist focused on business and technology topics.