
THE WORLD HAS SEEN A MASSIVE DEPLOYMENT OF ROBOTS

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Few stories in 2022 get the amount of attention as anything that touches Elon Musk, CEO of Tesla and SpaceX, and the individual with the world's highest net worth as of this writing. While news about Twitter tends to swamp the coverage of late, we were paying particular attention to Tesla's "[AI](#) Day."

A Humanoid Robot for under \$20,000¹

Tesla introduced Optimus to kick off the 2022 event. Importantly, even if a lot of progress has been made when measured on a year-over-year basis, this robot is not yet capable of acting anything like a regular person or performing job functions in full. Within robotics, it must be remembered that frequently the stuff that humans find the easiest—walking, balancing, picking up simple objects—is precisely the stuff that robots find the hardest. Having perfect recall of all the world's information or the processing power to do nearly any reasonable calculation is much more easily within the robotic wheelhouse and similarly much harder for humans.

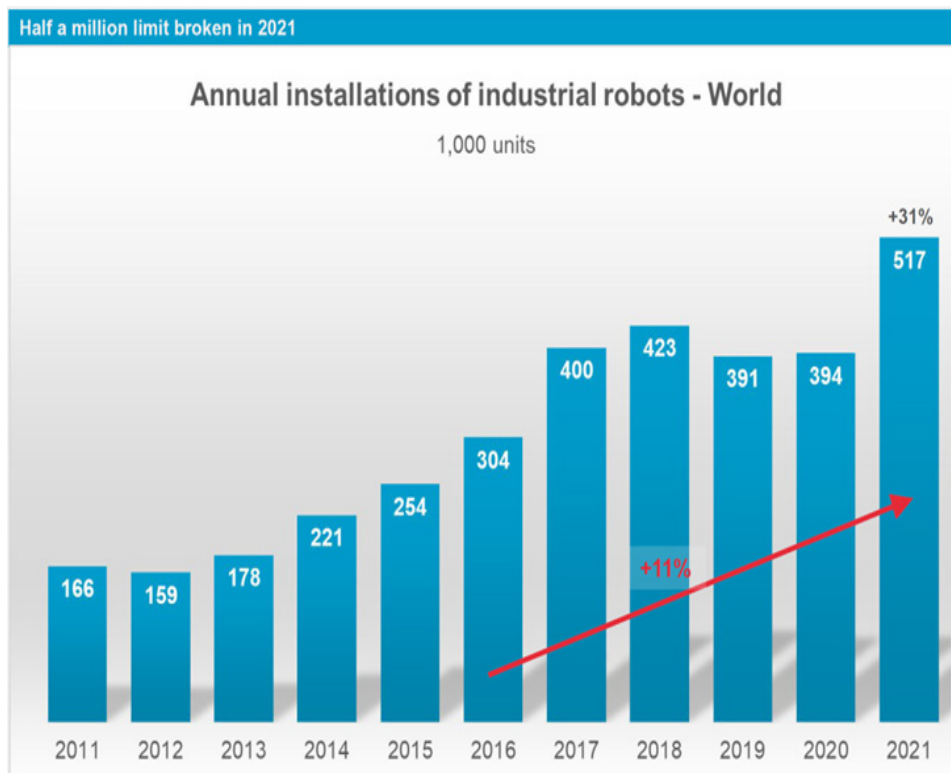
As is the case with many Tesla products, it will be important to continue to monitor the progress these technologies can make. We might think that robots like this could potentially lift heavy things, work in dangerous parts of factories or perform other higher-risk functions, but technological history has many examples of new use cases emerging once something is deployed at scale. Optimus and other similar products may lead in directions we haven't yet imagined.

2021 Sees Robotic Installations Hitting Record Highs

The International Federation of Robotics has an extensive array of information available for anyone seeking to learn more about different trends in the field of robotics. In figure 1, we can see²:

- 2021 saw 31% year-over-year growth in installations of industrial robots across the globe.
- 2021 was the first year where the annual installations of industrial robots surpassed 500,000 units.
- If one looks at the trend of growth for the period from 2016 to 2021, there was a clear trend of 11% annualized growth. This was by no means a straight line—after 2018's figure of 423,000 installations, 2019 and 2020 both dropped back below 400,000. In a sense, it appears that the 2021 figure of 517,000 re-establishes the trend of growth.

Figure 1: Industrial Robot Installations Have Expanded Significantly from 2011 to 2021



Source: "Welcome to the Presentation of World Robotics 2022," International Federation of Robotics, 2022.

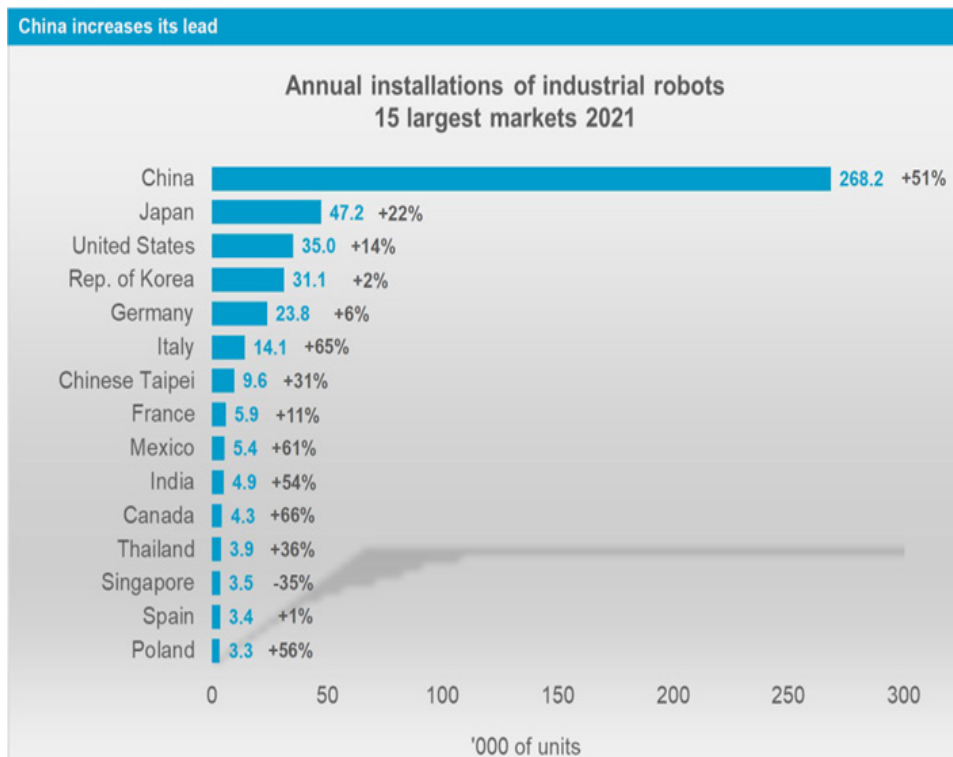
China Has a Huge Robotic Workforce

China is at the forefront of many geopolitical discussions as we write these words. The 2022 Party Conference on its own is a historic event, and we are also dealing with the ramping up of semiconductor export restrictions from the U.S., the continuation of "Zero-Covid" lockdowns and even speculations about what might or might not be in store for the "Taiwan Question."

But figure 2's image comes across as rather stark. It's not certain that many people would know or predict prior to looking at the data that China has the most industrial robotic installations—Japan or South Korea tend to be cited often. Yet:³

- China had 268,200 industrial robotic installations in 2021—more than half of the total number of global installations of 517,000 cited in figure 1.
- Japan is certainly a major market and was in the number two ranked position—but the drop from 268,200 to 47,200 is SIGNIFICANT.
- China had 97,000 installations in 2016, whereas the rest of the world had 207,000. 2021 marked the shift where China had more installations than the rest of the world after significant growth in the past five years.
- One of the more exciting growth industries was Automotive, where in 2020, China had 31,000 installations, and in 2021, 62,000 installations. We know that electric vehicles and smart cities are a major focus in China, and it's clear that this can be part of that investment effort.

Figure 2: China Is a Market Leader in Industrial Robotics



Source: "Welcome to the Presentation of World Robotics 2022," International Federation of Robotics, 2022.

Service Robots Could Be the Bigger Market

Industrial robots are certainly important and should continue to grow, but there is a broad range of possibilities for "service robots." One can think of service robots as any robot that is not bolted to a factory floor. In 2022, when it is difficult to fill certain types of jobs, service robots could be the ones that are more useful in this context.

Figure 3 shows one concrete example of a robot that is being deployed presently to help in cleaning floors. Floor cleaning is not the most glamorous of jobs, and in a tight labor market, it is still necessary even if finding the people willing to do it is much more difficult. The Tennant Co. T7AMR Robotic Floor Scrubber is sold with a specific eye toward appealing to an array of current concerns. The sales website indicates the robot helps to address:

- **Labor Challenges**—we know it is difficult to hire these types of workers in the fourth quarter of 2022.
- **Safety**—it is noted that the machine can be deployed safely in an environment alongside people.
- **Environment**—it is noted that the machine can use less detergent and less water, possibly appealing to the more environmentally conscious.

You might see this machine (or something similar) the next time you visit a local supermarket.

Figure 3: Tennant Co. T7AMR Robotic Floor Scrubber



Source: tennantco.com.

Conclusion: Robots Represent Potential Opportunities for Artificial Intelligence and Machine Learning

We frequently write about artificial intelligence and machine learning, and we are always trying to present them not as [black-box algorithms](#) but tools that seek to provide real, tangible solutions. The floor-scrubbing robot above is one such example, and it is noted that it is powered by BrainOS, an artificial intelligence software platform that powers the world's largest fleet of autonomous mobile robots. While cleaning the floor might seem simple enough, we have to remember that the robot is also navigating, avoiding obstacles, adapting to changing environments (think-people moving around it) and more.

Even in a difficult economic environment and one that has seen challenging equity performance, we believe it is an interesting time to be thinking about these [megatrends](#) and companies like BrainOS seeking to deploy these technologies at scale. The [WisdomTree Artificial Intelligence and Innovation Fund \(WTAI\)](#) is focused on finding companies providing interesting solutions that use artificial intelligence to help solve some of the day's problems.

Christopher Gannatti is an employee of WisdomTree UK Limited, a European subsidiary of WisdomTree Asset Management Inc.'s parent company, WisdomTree Investments, Inc.

As of October 26, 2022, WTAI held 0%, 1.66%, 0% and 0% in Twitter, Tesla, Tennant Co. and Brain OS. Click [here](#) for a full list of Fund holdings. Holdings are subject to change.

¹ James Morris, "Tesla AI Day 2022: Musk Demonstrates Optimus Humanoid Robot for Under \$20,000," Forbes, 10/1/22.

² Source: "Welcome to the Presentation of World Robotics 2022," International Federation of Robotics, 2022.

³ Source: "Welcome to the Presentation of World Robotics 2022," International Federation of Robotics, 2022.

⁴ Source: Christopher Mims, "Meet the Army of Robots Coming to Fill In for Scarce Workers," The Wall Street Journal, 10/15/22.

⁵ Source: braincorp.com

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DEFINITIONS

Artificial intelligence: machine analysis and decision-making.

Black box algorithm: A black box algorithm is one where the user cannot see the inner workings of the algorithm.

Megatrends: A major movement, pattern or trend emerging in the macroenvironment; an emerging force likely to have a significant impact on the kinds of products consumers will wish to buy in the foreseeable future.