

## The Path to Automation

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“Knowing is not enough; we must apply. Willing is not enough; we must do.”

– Johann Wolfgang von Goethe

Since its inception, the [Granny Shots](#) stocklist has identified the worsening global labor shortage as a long-term trend, and sought to benefit from the role that AI and automation are anticipated to play in addressing this structural economic shift. This call paid off in 2023, as advances in generative AI chatbot technology captured widespread interest and fueled gains in longtime Granny Shot stalwarts like \$NVDA, \$MSFT, \$GOOG, and \$AMD.

However, these names focus on only the first half of the AI/Automation tailwind, and only part of the solution to the global labor shortage. The other half has to do with automation, and it is on this half that we focus in this issue of *Signal from Noise*.

[Artificial intelligence](#) has focused on replicating (or even improving on) the capabilities of the human mind. But as the noted German polymath and philosopher Johann Wolfgang von Goethe would argue, human labor is not just about the mind, and many jobs do not require generative intelligence, whether human or artificial. Technology that can gather information from the real world – not just digitized data – and technology for navigating and acting on the real world is just as important.

### **Analog to Digital**

The real world differs from cyberspace, virtual reality, and the (still nascent) metaverse in one major way: it is analog – the sights and sounds of the world in which we live are continuous in time and continuously fluctuating in amplitude and frequency. In contrast, computers make use of digitized information comprised of discrete bytes. Both automation and AI require the prerequisite ability to convert analog information into digital data. The process of doing so is best left to specialized semiconductors that can deal with analog and mixed-signal information.

### **Texas Instruments (\$TXN)**

Texas Instruments is the largest manufacturer of analog semiconductors, including sensors, amplifiers, and power-management products, with a commanding and broad-based market share. Unusually in the semiconductor industry, Texas Instruments is an integrated manufacturer, with 15 of its own fabrication plants in North America, Asia, and Europe.

## **Analog Devices (\$ADI)**

Analog Devices is another leader in the field of production of analog and mixed-signal processors. ADI's products include sensors to measure physical attributes such as temperature and pressure, as well as signal conditioners to amplify analog signals and/or convert them into digital format. Analog Devices boasts a client base that is 125,000 strong and includes customers concentrated in the Industrial, Automotive, and Communications sectors. Like its rival, \$ADI also runs its own fabrication plants, in the United States and Ireland.

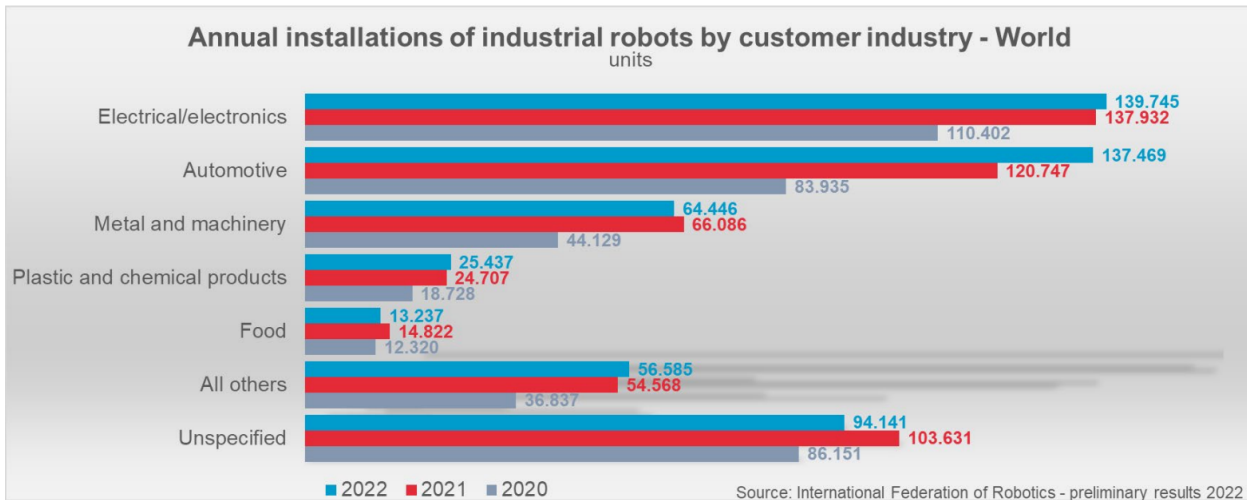
## **Cognex Corporation (\$CGNX)**

A number of tech giants are heavily invested in advancing computer-vision technology, but Cognex stands out for its focus on solutions in this niche field. Just as with humans, AI and automation systems are heavily reliant on the ability to gather and interpret visual information. Effective computer-vision technology is essential to self-driving vehicles and the analysis of X-rays, MRIs, and other medical scans. In manufacturing, it enables machines to maximize or replace human efficiency in product assembly, quality control, and inventory management. In agriculture, it drives improved yields through automated, optimized harvesting; weed/pest control; and crop monitoring. Cognex provides cameras, sensors, software, and complete computer vision solutions to manufacturers in almost every industry, including automotive, electronics, food and beverage, and security. Its offerings are often incorporated into the products of automation OEMs in a variety of settings.

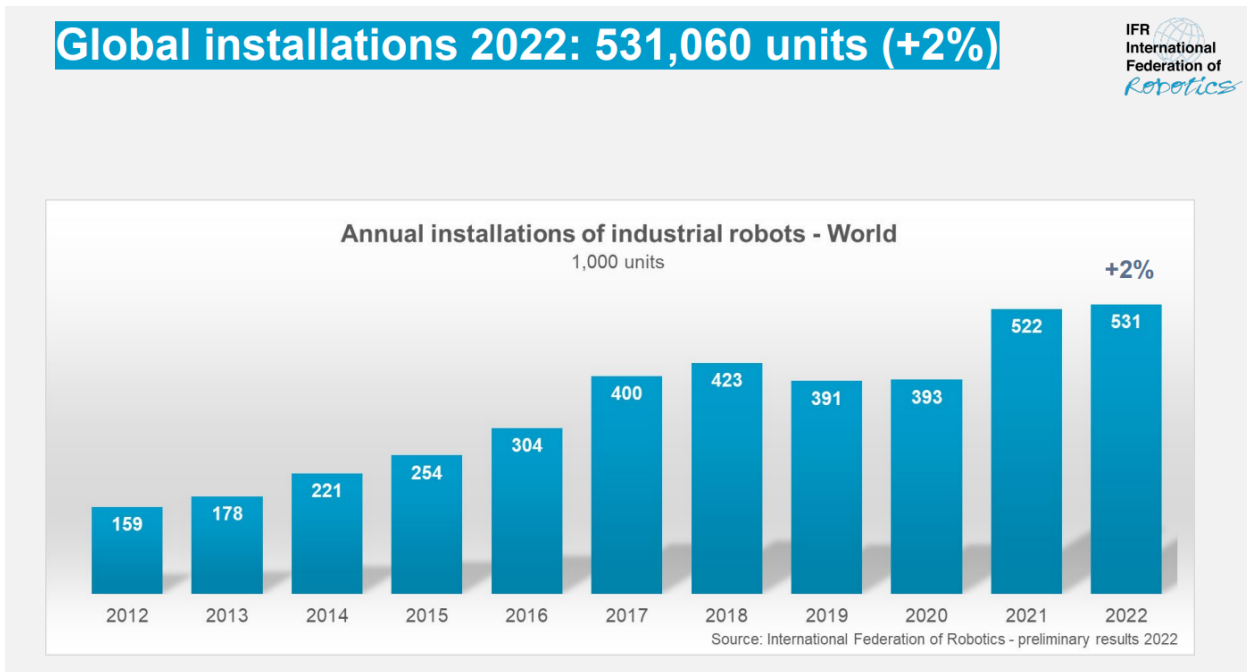
## **Industrial Automation and Robotics**

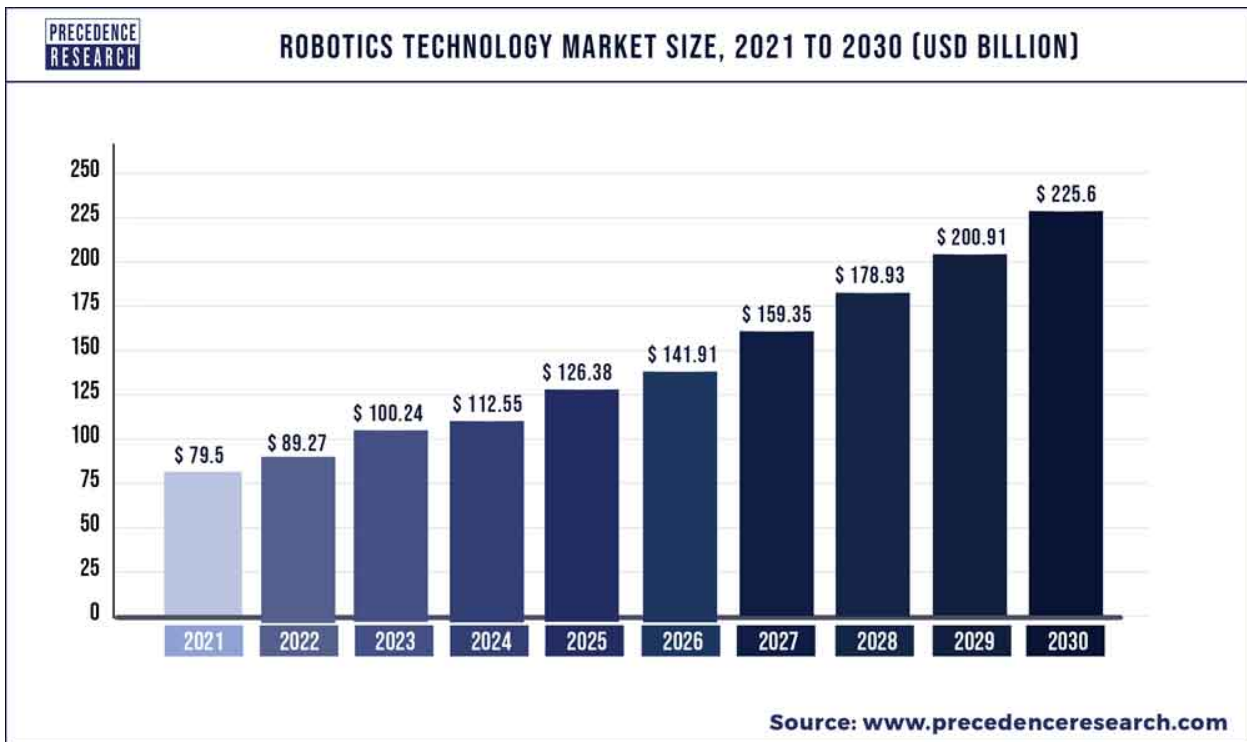
Solving the global labor shortage requires technology that can act autonomously on the physical world. Luckily, this is a problem that humans have been working on for some time now. The first industrial robot was developed in 1959 by George Devol and Joseph Engelberger. Dubbed the "Unimate," it was put to work in a General Motors assembly line in New Jersey in 1961, taking on the dangerous job of transporting and stacking freshly die-cast parts like door handles, gearshift knobs, and other interior hardware.

Though GM ultimately retired Unimate (it would also have a brief career in entertainment, appearing on Johnny Carson's *Tonight* show in 1966), the automotive industry would go on to become one of the first to integrate robotics at scale into its manufacturing operations. Other industries have since followed:



Unsurprisingly, the number of industrial robots continues to climb as a result, and this trend is likely to continue for years.





Some of today’s leading robotics companies include:

**FANUC (\$FANUY)**

Japan’s FANUC is one of the largest manufacturers of industrial robots in the world, and it is also a global leader in factory automation systems. Originally part of Fujitsu and now a constituent of both the TOPIX 100 and Nikkei 225 indices, FANUC has long played a key role in the robotics initiatives of General Motors, and it has a strong presence throughout the automotive and electronics industries.

**ABB (\$ABBNY)**

Based in Switzerland, ABB is the largest provider of industrial robots to the automotive industry in the world. It is also a leading provider of robots used in factories and warehouses. Among 300 robot varieties in its lineup, are those specialized for tasks just as welding, painting, and small-parts assembly. It also has a strong presence in the industrial automation segment.

**Boston Dynamics (\$HYMTF)**

Originally spun out of a project at the Massachusetts Institute of Technology (MIT) and acquired as a subsidiary of Hyundai Motors in 2021, Boston Dynamics makes transportation, logistics, and military/law enforcement robots. Its lineup includes both wheeled and quadrupedal robots. To the broader public, Boston Dynamics is perhaps better known for its bipedal humanoid Atlas robots, which have been shown navigating obstacle courses and performing acrobatic parkour-style feats.

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*Boston Dynamics' "Atlas" robot*

*Source: Boston Dynamics*

The earliest robots were cumbersome to program, and they could only be used for basic, simple, repetitive tasks with few if any variables involved. With improvements in technology, robots have become more sophisticated and programmable. Specialized classes of automation solutions have also been developed to facilitate the programming and control of industrial machines – including robots. In order of complexity, these include (but are not limited to):

- **Remote terminal units (RTUs)** – Simple, inexpensive, and easy to install, RTUs' primary advantage lies in physical robustness. RTUs are generally used for simple automations in harsh environments such as oil rigs and power plants. However, they can also be connected to distributed control systems (DCSs, see below)
- **Programmable logic controllers (PLCs)**– Versatile, easily programmed (and reprogrammed), and more resistant to cyberattacks or tampering than RTUs, PLCs are a popular choice for simpler and more static automations. They are basically rudimentary, but highly specialized, small computers that use ladder logic, a relatively simple graphical language that is easy to learn.
- **Programmable Automation Controllers (PACs)** – An iterative evolution of PLCs, PACs are more powerful and capable. They are useful for more complex automations, particularly those that require real-time adjustments or responses to analog information. These improved capabilities are tapped using C and C++ programming, which is regarded as slightly more difficult to learn than ladder logic. It is worth noting that the line between PLCs and PACs is somewhat blurry, and these terms are sometimes used interchangeably.
- **Distributed control systems (DCSs)** –While PLCs and PACs are each designed to control single machines, distributed control systems can be used to control multiple machines at once. This makes them useful for coordinating complex, multistage processes, particularly in facilities that operate continuously and on multiple batches simultaneously.

The leading companies in industrial automation each offer a broad range of products and solutions that incorporate most or all these. They include:

### **Siemens (\$SIEGY)**

This German conglomerate is one of the largest providers of automation solutions and software in the world, and automation is a key driver of growth and revenue for the company. Siemens' offerings include systems for industrial/factory automation, building automation, and transportation automation (particularly in the railroad subsector).

### **ABB (\$ABBNY)**

Unsurprisingly given its involvement in robotics, ABB has also become one of the leading producers of factory automation systems and solutions in the world. The company's PLCs and DCSs are used in numerous industries, including power generation, water, and manufacturing.

## Rockwell Automation (\$ROK)

Rockwell is a major manufacturer of automation control hardware, software, and bundled solutions. Its products include the well-regarded Allen Bradley range of PLCs, sensors, and robotic control systems. It also provides assessment and consultation services.

### Software 'bots

Workforce shortages are a function of age-related demographic shifts and trends. This affects both labor-intensive, physical vocations as well as those jobs traditionally thought of as "white collar." Thus far, we have only discussed solutions in the former.

When it comes to addressing workforce shortages in the office, one way to do that is to automate relatively repetitive tasks such as filling out forms, data extraction and entry, or generating routine reports. This is where robotic process automation excels. In RPA, software "robots" can replace human workers or amplify the efficiency of employees in helping to process claims, transactions, and invoices; generate routine, standardized reports; fulfill HR responsibilities such as payroll processing and benefits administration; and handle basic IT tasks such as issuing hardware, managing software licenses, and processing tickets.

Intelligent process automation takes that one step further by integrating machine learning and artificial intelligence to create bots that can simulate human judgment and analysis in taking care of more complex tasks like fraud prevention, responding to basic customer requests, and data analysis.

Two of the leading providers of general business automation services are:

## UiPath (\$PATH)

UiPath is one of the largest dedicated providers of business automation software solutions. Originally founded in 2016 as a provider of RPA services and solutions, it has made significant efforts in transitioning into intelligent process automation, working to incorporate artificial intelligence and natural language processing capabilities throughout its portfolio. UiPath broke the \$1 billion milestone for revenues in its most recent fiscal year (which ended on January 31, 2023), with nearly 11,000 customers.

## IBM (\$IBM)

Business automation was a logical extension to IBM's cloud and AI businesses, and the company's RPA and IA offerings are a core pillar of its software and consulting businesses. IBM provides a range of products in this field, including automated content management, document processing, account opening, and decision-making, as well as IT automation.

Three Granny Shots are involved in very specialized forms of industrial automation. They are:

**Cadence Design Systems (\$CDNS)** – Cadence is a leading provider of software that helps to streamline and automate the semiconductor design process, allowing chip designers to make more efficient use of their skills and time. Its products help not just with the design process itself, but also in running testing simulations and fine-tuning optimizations.

**ServiceNow (\$NOW)**– ServiceNow is a provider of IT management automation solutions for companies in the healthcare, financial services, manufacturing, telecommunications, and technology industries, as well as public-sector organizations.

**KLA Corporation (\$KLAC)**– KLA specializes in solutions that improve the yield and efficiency of semiconductor fabrication facilities. As part of that, the company offers automation solutions for each stage of the manufacturing process, as well as in the defect-detection stage.

### **Final words**

Many of the most important companies in the field of automation are also key players in the field of artificial intelligence. This should not be a surprise: Although automation and artificial intelligence are distinct fields of endeavor, the two are inextricably intertwined and often overlap. Many of the companies mentioned here are working to incorporate artificial intelligence into their offerings, while artificial intelligence development often depends on advances in automation.

Therefore, although we attempted to cover fresh territory in our discussion today, many of the companies discussed in our previous piece on AI – names such as Nvidia, Microsoft, and Alphabet – should also be seen as automation companies.

As usual, *Signal From Noise* should serve as a starting point for further research before making an investment, rather than as a source of stock recommendations.

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