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Robots Rising
Tracking the Shift from Industrial to Intelligent Automation

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While the average reader may not know it, 2020 is the year of an important anniversary where the topic of smart machines is concerned. One hundred years ago, the word "robot" entered the English language, and with it, global popular culture. A century later and today's mechanical robots are no longer consigned to fiction; they are an everyday fact of life at the consumer and industrial levels.

Compared to their 20th century counterparts, they are also getting smarter. Much smarter. So much so, that a new term, "intelligent automation," has come to dominate. And increasingly, it's being applied to existing industrial automation processes as a type of upgrade or transition from Industry 3.0 to Industry 4.0 and beyond. Regardless of I-status, industrial automation is a term that speaks broadly to the use of robots or machines to perform tasks once relegated to humans on the factory floor.

Thus, in a moment when the world faces a variety of unique challenges – most pressingly COVID-19 and its public health and economic fallout – intelligent automation (IA), artificial intelligence (AI) and machine learning (ML), is finding enhanced relevancy as Industry 4.0 continues to mature. Already, despite worrisome short-term automation industry outlooks, the fine print in at least one survey conducted by the Association for

Advancing Automation (A3) says something else: "Our solutions are in higher demand; COVID-19 is bringing new opportunities," and "orders are 3x the normal level."

Not only does adopting intelligent automation slash completion times and increase efficiency. It provides companies a competitive edge. By using the technology to make better decisions that will, in turn, benefit its own customers, saving time, money and resources, companies will be better equipped to handle a variety of current and future obstacles, including COVID-19.

So while the virus and its related challenges are a cause for concern, intelligent automation inspires innovative leaders to think big, think broad and be creative.

From Automation to Industrial AI

For industrial processes and the 3D scanning industries looking to adopt automation, the public health challenges we face could prove the ultimate innovation catalyst. Or as a recent Brookings Institution article put it in its provocative title: "The robots are ready."

While the industrial revolution has always been about machines doing more work faster it wasn't until the late 1960s, with the advent of the world's first programmable logic controller (PLC) that advances in computer technology enabled industrial automation to take off. Often called "lights-out manufacturing," it's a factory devoid of human intervention.

To be sure, the fully automated lights-off factory has yet to materialize. But what could get us from industrial automation to intelligent (industrial) automation faster, is machine learning, a subset of artificial intelligence as (semi) smart machines learn new tasks. Ideally, this learning will take place with little human involvement. And, as evidenced by recent advances made by Google, next-generation autonomously learning robots will be able to teach themselves—the first step toward factory floor applicability. Whether this is the province of Industry 4.0 or the opening vistas of Industry 5.0 is open for debate.

In the broadest sense, machine learning (ML) is, as its name implies, the ability for a machine to be taught specific tasks and trained to react to the challenges it encounters—a building block of artificial intelligence. For a machine to learn, much like a human, it must be exposed to an enormous amount of data. Algorithms must be written, designed to predict outcomes based on the information received. Thanks to the proliferation of the Internet of Things (IoTs), many devices now record data in real time and can send that information over wireless networks. The raw material needed to draw conclusions and act in an intelligent manner already exists.

AI, or the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making and translation between languages, is what powers predictive searches on Google. It's what generates relevant advertising based on previous articles users click on. It's what populates personalized social media news feeds. It's how digital assistants like Amazon's Alexa and Echo and Google Home—already in the homes of nearly half of all Americans—work.

Applied to a factory setting, some of the key benefits of AI include:

✓ **Predictive analysis:** Demand for many products will remain variable. A factory employing AI processes will be able to predict the volume of parts required. Perhaps only at the beginning of the manufacturing process will a plant manager be alerted to the predicted inventory needs. At some point, even that task may be left to automated, semi-intelligent machines.

✓ **Part maintenance:** Knowing when and how a part will fail is something only humans can do, right? Not necessarily. With enough data fed into a system, algorithms can already accomplish this task. Planning for a breakdown before it occurs could be especially beneficial in a future where supply chains for assembled parts might be less reliable. Smart stockpiling (buying in bulk at the optimal exchange rate) could be led by this AI-ML union.

✓ **From robots to cobots:** For decades, industry has been home to robots—large, bulky and often unsightly creatures that accomplish the dull and dangerous tasks humans cannot or will not do. Cobots, or "collaborative robots," are smarter, smaller, and can work with humans on increasingly complex tasks safely. Partnering with a cobot is a great post-pandemic way to collaborate and a novel twist on (silicon) social distancing. In fact, according to ABI Research, the yearly revenue for cobot arms is forecast to reach $11.8 billion by 2030. Combined with related software revenue and end-of-arm tools, that figure jumps to $24 billion.

✓ **Well-being oversight:** Keeping staff safe is always top of mind for every industry. And smart machines can be an effective staff management solution. Remote temperature taking is only the first advance. Security lockouts and the ability to inform superiors of an employee's ill health is next-step automation and AI at work.

✓ **Remote operations:** Instead of human eyes being first to detect quality control and process issues on the shop floor, AI machines fitted with sensors could inherit that task. Envision an almost entirely remote workforce where machines bring potential design and measurement flaws to the attention of management in the comfort of their own homes.

Going the Distance

As the world continues to face a multitude of overlapping challenges, some COVID-related and some not, it's tempting to put forward-thinking discussions and real-world industrial applications on hold. After all, global manufacturing has been challenged in 2020 like never before and as a result, the desire to incur the high startup costs typically associated with automation has been stymied.

Why embrace the technologies of tomorrow when the outlook today seems bleak?

Because the wellspring of human innovation is at its best when times seem at their worst.
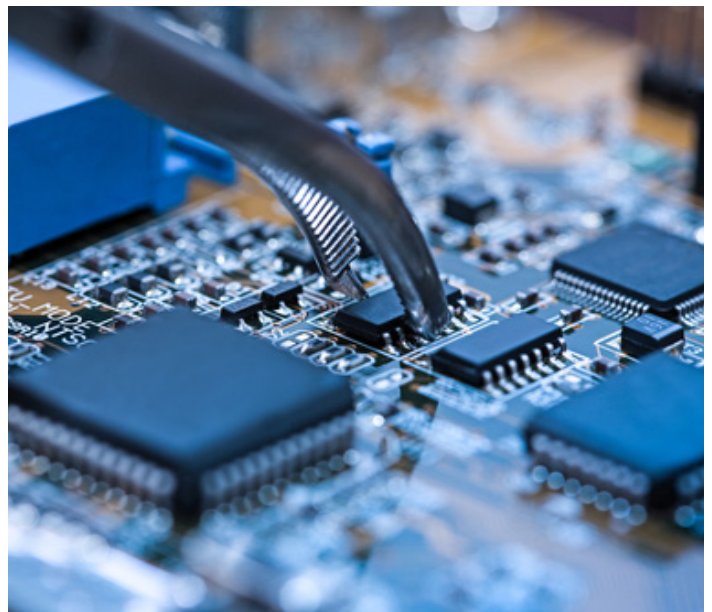
In the long arc of humanity's industrial progress, from the earliest mill towns of central England in the 18th century to the silicon sanctuaries of the 21st, rare has an advance not been inspired by a pressing need.

World War II heralded the jet, rocket and computer age. Anthropogenic climate change is helping advance the burgeoning green economy.

Now, industrial automation, ML and AI, ignited in part by the COVID-19 spark, will serve as a safeguard for public health, while simultaneously propelling us into a faster, more efficient, more accurate and more precise future. For companies that do become the trendsetters and embrace the tenets of intelligent automation, the competitive differentiation alone could be the edge they've been looking for.

That's a prediction you can bank on—whether you're a human or an AI industrial machine.

Know, Plan, Act: Intelligent (Pre) Investment Initiatives

- **KNOW** that businesses of all sizes and industries must think beyond the current economic slowdown and global health crisis. The challenge of today is only a catalyst for innovation tomorrow. The goal is to thrive, not just survive.

- **PLAN** to evaluate your current end-to-end industrial processes and ask the following questions:
  - How has the virus impacted them?
  - Assess your automation startup costs while evaluating future needs. What does the timeline of deliverables look like?
  - How difficult/costly will it be to train staff to work with new machines?
  - Do you have access to capital to make these investments?
  - Can you afford third-party review before initiating an automation upgrade?
  - Is there one area of your business that should automate first, say, in smart warehousing?

- **ACT** with awareness that "Industry 4.0" isn't just a buzzword. It's happening now, and it is taking the computerized and semi-automatic functions of late Industry 3.0 and applying AI and ML technologies. In many instances, elements of Industry 3.0 only require an upgrade rather than overhaul—adding new functionality to older systems.

- **KNOW** that additional secondary costs like cyber security will need to be factored in. AI factories and cloud-based data networks require enhanced firewalls and safeguards against internal or external attack.

- **PLAN** with the understanding that the transition to intelligent automation is only just beginning. While the majority of manufacturers are incorporating some elements of it, less than a third of manufacturers are maximizing its potential.

- **ACT** with determination. Industry experts can offer a lot of assistance in creating a roadmap tailored for your company.

About the Author

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