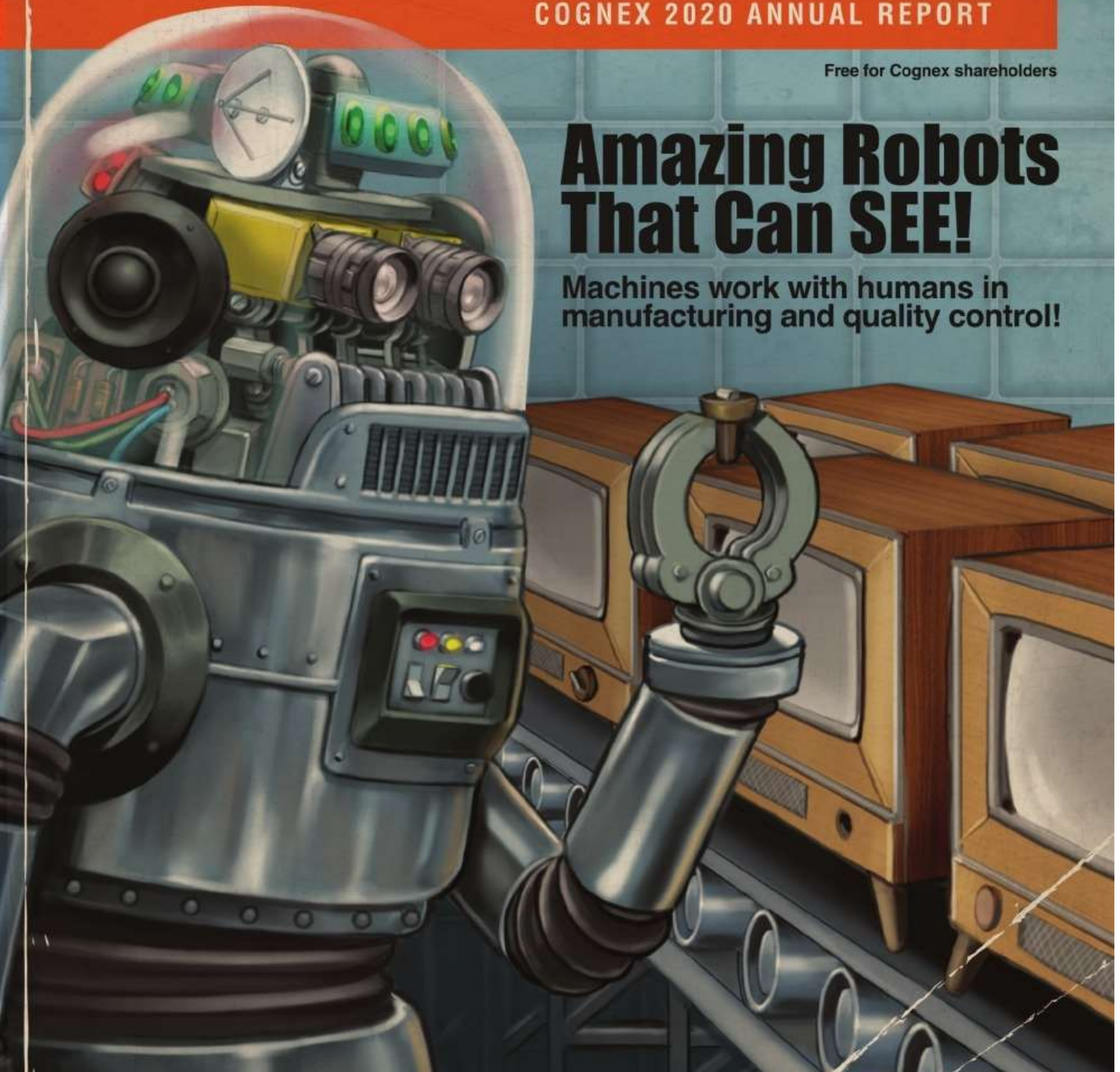# POPULAR SCIENCE

COGNEX 2020 ANNUAL REPORT

Free for Cognex shareholders

Amazing Robots That Can SEE!

Machines work with humans in manufacturing and quality control!

Hey Old Buddy!

Thanks for the New Year's card and the family photo…I can't believe you're now a Grandpa! Well, it's been quite a year, and even longer since I've written to you, so here's a quick update.

My two boys have grown up, finished college, and moved out. So, my wife and I decided to downsize from our large home to a condo…and that meant getting rid of a lot of stuff! As we were going through all the "valuable" things we stored up in the attic, guess what I found? My collection of *Popular Science* magazines!

Man, how I loved reading those articles back in high school. Remember those crazy days and the cafeteria's greasy fried fish sticks? And, I still haven't forgotten our senior prank with the water balloons! Couldn't get away with that nowadays.

Sorry, I digress…hahaha! Well, as I was leafing through the magazines, I was reminded of their far-fetched predictions of inventions we'd see in the future. While most never came true, like flying cars (not yet anyway), one of their predictions most certainly did.

What you're holding right now is a *Popular Science* issue from the early 1960s that predicted robots could see! It speculated that computers would take images from cameras and understand them, which would lead to robots performing human-like tasks on the manufacturing floor. Can you believe that? They accurately "envisioned" machine vision back then!

The only thing *Popular Science* didn't forecast was the company that would bring these incredible capabilities to life: Cognex—the company that I founded in 1981.

Cognex isn't just the company that pioneered machine vision, it's also the world's leader, having sold over $8 billion worth of vision systems to manufacturers around the globe. Our systems help produce defect-free products and then help e-tailers load them on the right truck and send them to the right customer—every time.

Well, old friend, this issue is bound to be a collectible…so I want you to have this copy. After all, you invested in Cognex by sharing my belief in machine vision and its potential. We both thought machine vision would not only be a profitable investment, but that it would also be a technology which makes it possible to manufacture and distribute products at higher quality and lower cost for everyone to enjoy. Kudos to us!

Hope 2021 is a great year for all of us…and we look forward to seeing you guys soon!

Warm regards,

Dr. Bob!

Robert J. Shillman ("Doctor Bob")
Chairman and Chief Culture Officer

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A bold move into the future.

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Talk about convenience.

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Deep learning changes the game.

Cognex 2020 Annual Report

Popular Science

SCIENCE AND INVENTIONS

MECHANICS AND HANDICRAFT

SPECIAL REPORTS

One thing we can predict with confidence is the nasty letter we'll be
getting from a lawyer at *Popular Science*. But, hey, this is a parody
and clearly NOT a real issue of *Popular Science* magazine.
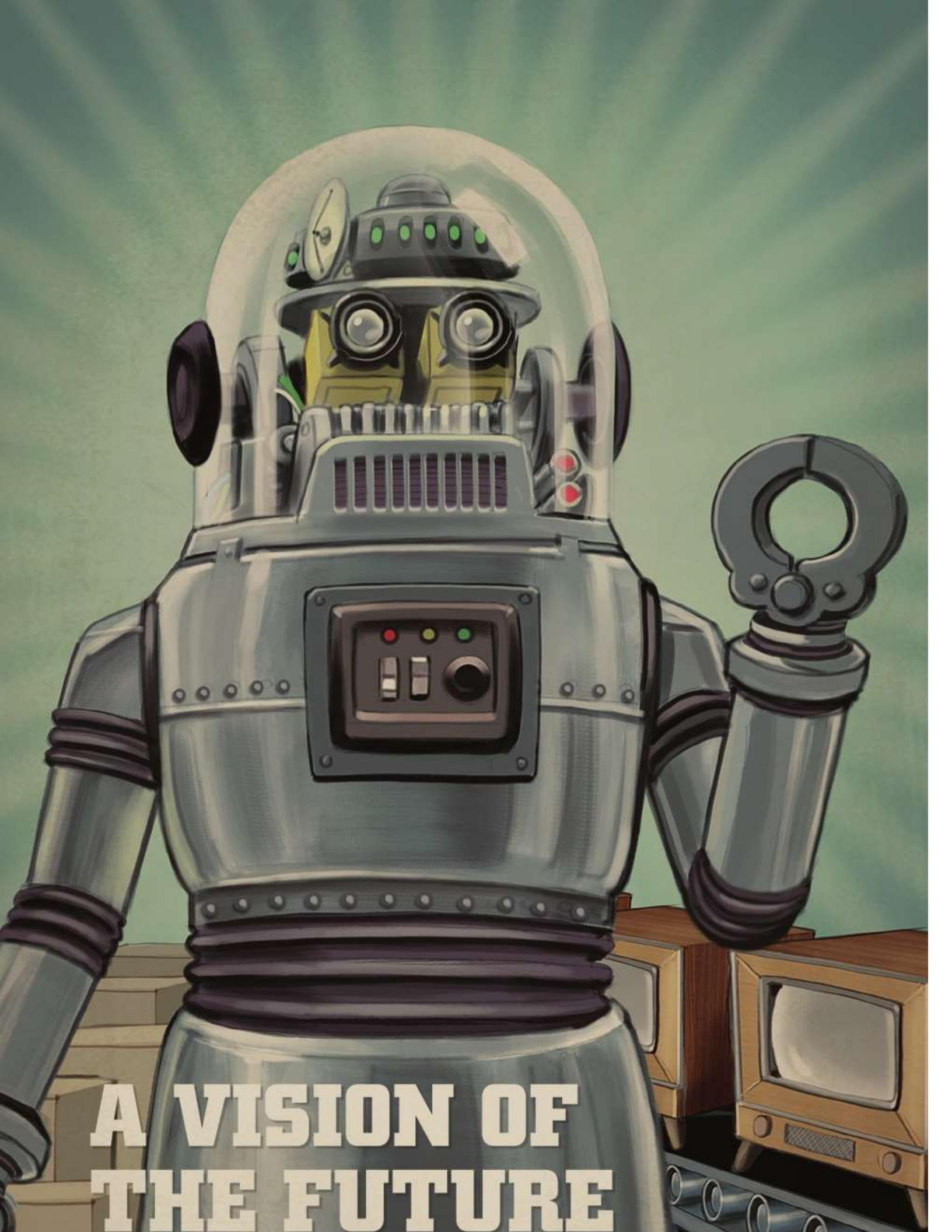
A VISION OF
THE FUTURE

Amazing robots that can see!

Robots will soon work alongside humans in a bold bid to improve manufacturing productivity and product quality.

Experts believe an exciting new technology called machine vision will someday give robots the gift of sight. This will help improve the quality of life for thousands of people who work each day performing mundane tasks that can be done better and more cost-effectively by machines. Manufacturers worldwide will view machine vision as essential to their operations and their plans to introduce new products at prices everyone can afford.

Operating much like your eye, the lens and a light-sensing device on a machine vision system will capture the image, and then advanced computer software, like your brain, will make sense of what is seen. Within a factory, color, light, movement, and perspective will all influence how well robots will be able to see. Solving for these variables while also achieving the high level of reliability required in fast-paced manufacturing will be a considerable technical challenge. And, of course, the price of those vision systems must be affordable.
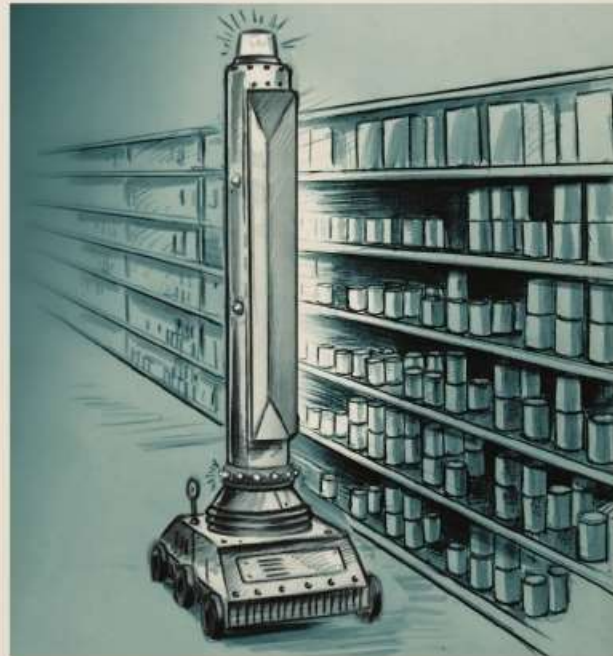
Future machine vision companies will require significant technical expertise and application experience and sound business judgment to succeed. There will be many engineers who can come up with acceptable machine vision algorithms, but creating them to run efficiently on low-cost hardware will be a complex problem solvable only by the best engineers, of which there will be few in the world.

The early adopters of machine vision will be companies with highly skilled teams of manufacturing engineers, and they are expected to be the largest users of this future technology for many years. However, as time goes on, machine vision systems will become easier to integrate and use, enabling more industries to adopt them.

The ability for machines to see will initially be based on rules that engineers will write; for example, to find the edges of a product and to then measure its width. But, we predict that over time, this type of rule-based vision will be supplemented by a new technique—which we will call "deep learning"—that will revolutionize machine vision's capabilities and allow systems to learn, from experience, a good part versus a bad part, the way that humans do. Tasks that were very difficult or impossible to perform with the best rule-based vision, such as finding and classifying surface blemishes, will become possible, significantly expanding the role that machine vision systems will play in factories around the world!

> **With machine vision, the sky is the limit for new technology products!**

Left: The artificial-intelligence wonder known as Robo-Rob 9000 takes on boring repetitive tasks in manufacturing, thanks to machine vision. Standing an impressive eight feet tall, Robo-Rob 9000 can also help around the home by cleaning gutters and keeping your kitchen floor spotless.

Above: There's no end to the tasks Robo-Rob Lite can perform! It can navigate supermarket aisles 425 times consecutively to see what products need replenishment without having to be recharged—and it won't get bored!

# New Ideas from the Inventors

Catalogs in the clouds. Special radio waves invisibly linked to home appliances will enable consumers to order products simply by pressing a button. Once the order is received, machine vision will help retailers find just the right products in inventory at lightning speed and then automatically label packages for overnight delivery to anywhere in the world. Just imagine: no more Sears catalog forms to fill out...and no more ink smudges!

Telephones that fit in your pocket. Thanks to the visual acuity of machine vision, we will be able to manufacture super-small phones that people can carry with them wherever they go. Talk about convenience! No more missing important calls or straying only as far as the cord can take you. Who knows, maybe one day the phone will double as a calculator or camera!

Rechargeable cars. You'll never have to worry about long lines at the gas pump again thanks to a car powered by electricity. Need more fuel? Just plug your sedan into an outlet to charge it up! High-quality batteries manufactured under the watchful eyes of machine vision will ensure optimum performance and maximum capacity.
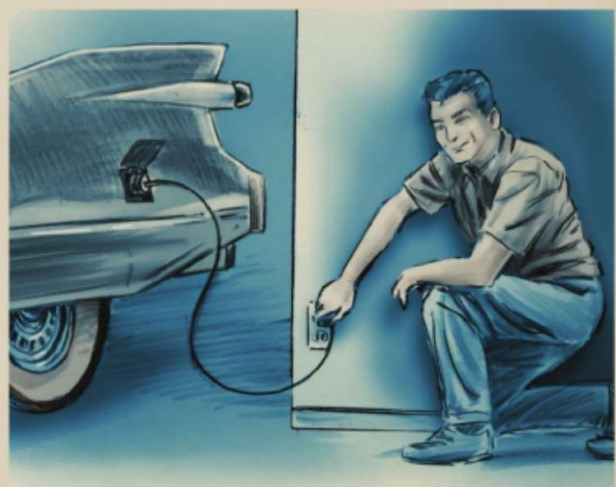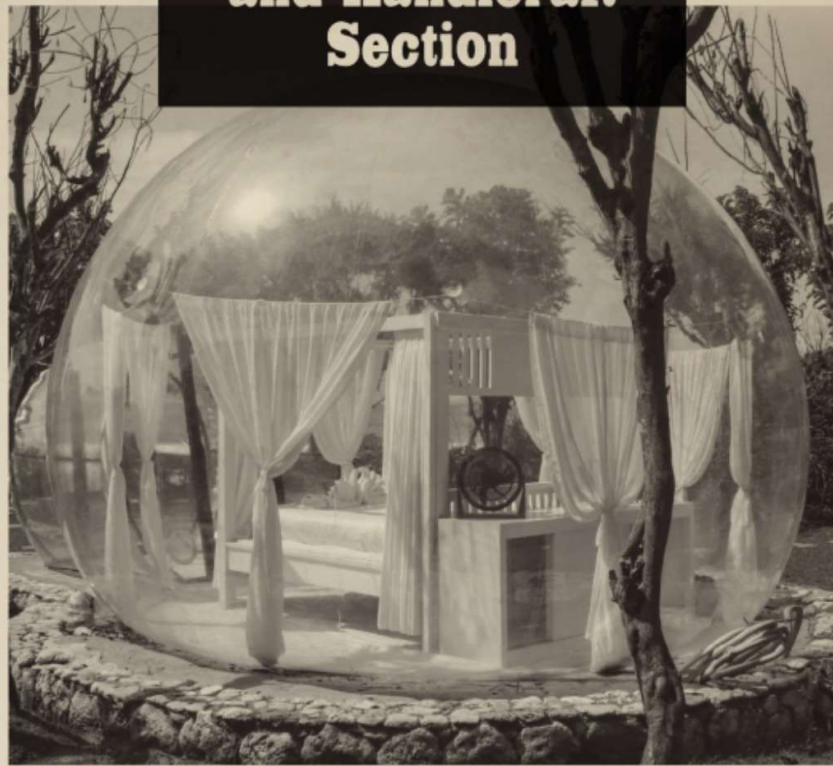
AS A FAMILY ROOM: Play games, watch TV, eat dinner, and more—all while knowing that your family is safe from germs.

AS A PORTABLE OFFICE: Separate at-home work from the rest of your life during lockdowns.

AS A GREENHOUSE: Grow vegetables year-round and eat healthy, locally sourced produce!

Air-bubble huts save lives by keeping your family healthy.

By Dewey U. Self

BELIEVING that newly discovered viruses may someday blow into global pandemics, some scientists suggest preparing for the worst. If it does happen, we could see widespread disruption to everyday life with social distancing, mask wearing, sanitizer stations, and panic shopping becoming the norm.

Can you imagine being quarantined at home with your entire family? Carve out alone time in a virus-free air-bubble called the Doctor Bobble. Requiring minimal site preparation, simply erect it in your backyard with common household tools and enjoy the same activities as always.

The best part is that the Doctor Bobble can also act as a movable vacation home. It weighs less than 1,000 pounds and can be set up by two adults in just a few hours. Enjoy stargazing without even leaving your bed! The DIY Life, Inc. makes the Doctor Bobble for $2,985 and up, depending on size.

AS A GAME ROOM: Exercise as a family to limit weight gain when gyms go on lockdown.

MV Puzzlers By Cal Q. Lator

Manufacturing riddles for you to solve . . .

Case of the Mixed-Up Makeup

THE NEW YEAR'S EVE celebration was in full swing, but Joe and Betty are two hours late to the party. Betty ran out of makeup because her new eyeshadow palette contained the wrong shades. Its swanky gold case was gorgeous, but what good is that if it contains the wrong colors? Tell us how this problem can be fixed. And Happy New Year to you, too! *(See answer below)*

Case of the Toxic Chocolate

A GREAT WAY to celebrate the birthday of your child's teacher is with a box of chocolates. But with so many varieties to choose from, how can a manufacturer make sure boxes marked "allergy-friendly" are really free of gluten and nuts? *(See answer below)*

"I'd like to see them make..."

Flying cars for faster travel. A high-tech car of the future equipped with sensors to make sure you don't tailgate too close, crash your vehicle, or wipe out a flock of birds. How would these complex detectors be manufactured and assembled? With machine vision technology, of course!
— *G. Jetson, Los Angeles, Ca.*

A seeing-eye machine to prevent counterfeiting. Something that could quickly scan $100 bills to tell you if they're real or just really good fakes. This futuristic invention would take a bite out of white-collar crime!
—*J. Waddington III, Fort Knox, Ky.*

Easy-to-read X-rays to accurately reveal physical defects. By using machine vision and deep learning technology, doctors could quickly locate the patient's problem and help put an end to wasteful malpractice lawsuits!
—*Dr. Pepper, Chicago, Ill.*

Have a gadget idea you would like to see in general use? Send it to us! Use Government postcards only.

Write your name and address clearly. Contributions cannot be acknowledged or returned.
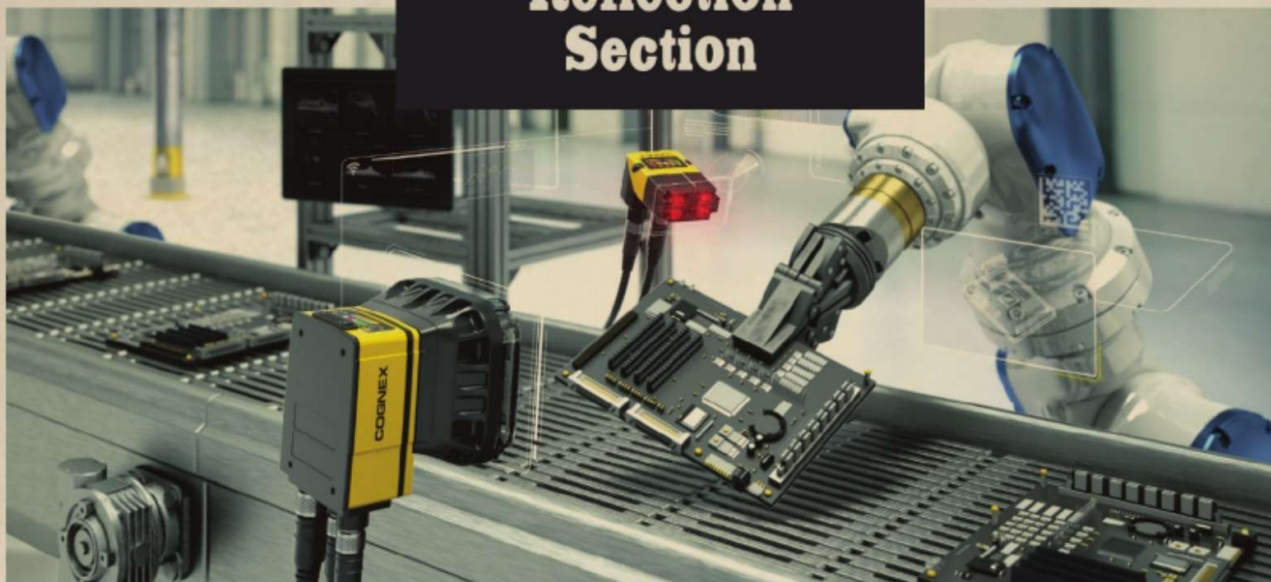
Look at How Far We've Come

Robert Willett, President and Chief Executive Officer

Like all great inventions, the idea of machine vision was initially met with skepticism. "Computers that can see? Never happen!" they said.

But the scientific community begged to differ. Thanks to the skill, imagination, hard work, and perseverance of pioneers like Cognex founder Dr. Robert Shillman, machine vision steadily evolved from science fiction to reality.

Fast forward to 2020: Machine vision is now used every day to enable the manufacture and inspection of billions of items all over the world.

To see how far this technology has come, let's review what Cognex accomplished this past year.

We entered 2020 thinking it was going to be a great year for Cognex. Then COVID-19 struck. Many of our customers delayed or reduced their investments in automation and machine vision due to disruptions in their global supply chains and other pandemic-related challenges. It became clear that revenue from the broad factory automation market would be lower than we had planned for in the quarters ahead.

We responded quickly by cutting discretionary spending and making the difficult decision to reduce our workforce by approximately 8 percent. We also restructured our organization to better support high-growth opportunities and to maintain our focus on technology leadership.

During the second half of the year, pandemic-driven demand from customers in the e-commerce logistics, consumer electronics, and life sciences markets more than made up for the slowdown in other markets that we serve—automotive, in particular, was hard hit. Because of that, we finished 2020 with annual revenue of $811 million, an increase of 12% over 2019. The fact that we could grow in such a challenging environment is proof of the broad market applicability of machine vision. As we are fond of saying, "Machine vision enables the manufacture of everything from potato chips to computer chips."

As a result of our swift action in re-allocating resources, Cognex was able to maintain a high level of support for our customers, many of whom relied on our technology to produce and deliver essential products and services through the pandemic.

The following sections summarize our performance by market, opportunities for growth, investment in technological innovation and last, but not least, the importance of our culture.

Deep Learning Investment is Paying Off

Deep learning is a revolutionary development in machine learning that provides a competitive advantage for Cognex. It broadens the scope of applications that our products can solve, and it expands our reach into new applications where rule-based machine vision didn't work without a large amount of customization.

In keeping with our Work Hard, Play Hard, Move Fast motto, Cognex both worked hard and moved fast to establish a leadership position in the deep learning space, which we estimate is growing by about 70% per year. Our acquisitions of ViDi Systems SA in Switzerland (2017) and Sualab Co., Ltd. in Korea (2019) have allowed us to quickly develop industry-leading deep learning products that are not only very effective, but also easy to use.

We introduced two groundbreaking deep learning products in 2020: In-Sight® D900 and VisionPro® Deep Learning.

The In-Sight® D900 is the world's first industrial smart camera embedded with both
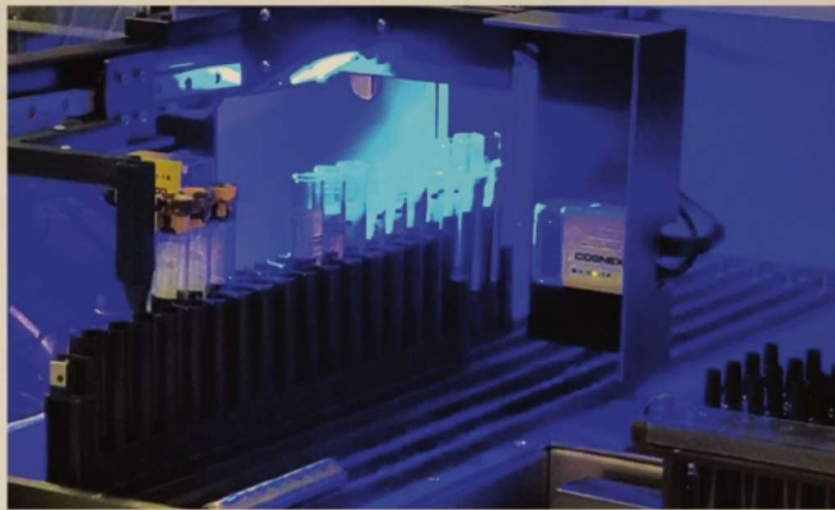
PerkinElmer's JANUS® G3 Blood iQ™ workstation relies on Cognex deep learning image analysis to provide traceable, efficient, and reproducible extraction of buffy coat from fractionated blood.

deep learning technology and rule-based vision algorithms. The D900 allows customers across many industries to solve a range of complex in-line inspection applications with ease, including optical character recognition (OCR), assembly verification, and defect detection. Demand for the D900 has exceeded our expectations, becoming Cognex's most successful product launch yet.

VisionPro® Deep Learning is a PC-based product that integrates the best of the ViDi™ and Sualab™ technologies with Cognex's powerful VisionPro® Software. It allows companies to automate a wide range of time-consuming manual inspections, resulting in significant cost savings as well as increased inspection accuracy and repeatability.

Continued Growth in Logistics

Logistics remains a strong growth driver for Cognex. We expect logistics to become our largest market in the next few years.

In 2020, Cognex revenue from logistics grew by approximately 40% over 2019, making

it our second largest industry. Growth was driven by increased investment from e-commerce companies, as the pandemic accelerated the consumer shift to online shopping.

Leading e-commerce companies continue to invest in Cognex barcode readers to make sure their products get to the right customers quickly and cost effectively. Customers in logistics are also turning to Cognex to meet other needs, such as measuring shipping boxes and inspecting them for damage with our 3D-A1000 vision system.

And beyond large e-tailers, Cognex continues to grow market share in logistics by solving new applications in under-penetrated regions.

The complexity of quickly and accurately fulfilling e-commerce orders is generating significant changes to warehouse operations that require increases in automation. Cognex products are being used throughout distribution centers to ship packages faster and more efficiently. For example, XPO Logistics, Inc., a global provider of transport and

2020 REVENUE BY INDUSTRY
PERCENTAGE ROUNDED TO THE NEAREST 5%

- CONSUMER ELECTRONICS: 30%
- LOGISTICS: 20%
- AUTOMOTIVE: 20%
- OTHER: 30%

logistics solutions, recently deployed hundreds of Cognex DataMan® barcode readers across its facilities in the U.K., Spain, and the Netherlands to help increase productivity.

Consumer Electronics Remains Strong

Consumer electronics is traditionally a strong market for Cognex, with much of our revenue coming from the assembly of smart phones and the manufacture of related components. Sales in this market were bolstered by pandemic-driven demand for computers, accessories, and remote connectivity devices for use by people working from home.

While we expect the COVID-related surge in demand to level off in 2021, we are confident that manufacturers will continue to rely on Cognex as they introduce new advanced features for smartphones and other popular consumer electronics.

Foldable phone screens, wireless charging, augmented and virtual reality, and the proliferation of 5G are just a few of the innovations that require complex automated manufacturing processes. And, where there is a need for advanced automation, there is often a need for machine vision.

Automotive Is Slowly Picking Up Speed

The automotive industry has been hit hard over the past couple of years. Anticipation of the shift to electric vehicles (EV) has resulted in a slowdown in capital spending, including purchases of machine vision. This slowdown, COVID-19, and the reported global overproduction of new vehicles has caused Cognex's revenue from this industry to remain at a sig-

Cognex DataMan® barcode readers help increase productivity for XPO Logistics, Inc. across the company's facilities in the U.K., Spain, and the Netherlands.

nificantly lower level than its peak in 2018.

Sales of new autos are beginning to rebound in China and the U.S. but still lag in Europe. While we believe the automotive market for machine vision will return to growth, we do not expect to see a full recovery in the near term.

Over the longer term, there are several emerging application areas that offer opportunities for Cognex. Potential growth areas include the use of deep learning for EV battery inspection and the assembly and integration of an ever-increasing amount of electronics and sensors in new cars to enhance safety and driver experience.

Life Sciences Offers High Potential

The life sciences industry uses Cognex vision to improve efficiency, prevent counterfeiting, lower production costs, and increase throughput for everything from simple diagnostic tests to DNA analysis.

Cognex had a total of 25 design wins from life sciences companies in 2020, ranging from equipment that processes

blood samples to medical imaging systems for diagnosing various types of cancer.

2020 RD&E INVESTMENT
DOLLARS IN MILLIONS
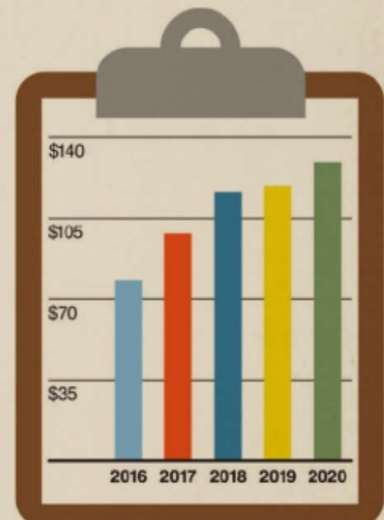
Cognex sustains its technology leadership by consistently investing in RD&E.

In addition to medical equipment, the life sciences industry invested in Cognex deep learning vision last year for a variety of COVID-related applications, including inspecting vials for vaccines and assembling test kits. We are proud to have been chosen by industry leaders to bring these important products to the world.

Although revenue from this market currently accounts for a relatively small percentage of our business, we expect it to grow quickly over the coming years.

Advancement in 3D Vision

3D vision is a fast-growing market with good long-term potential for Cognex. We are focused on developing innovative 3D products that help customers to quickly, accurately, and cost-effectively solve a range of 3D inspections on their automated production lines.

Cognex 3D vision products are used for solving in-line applications where a height or volume measurement is required, including measurement of critical features such as object flatness, surface angles, or part volumes.

In January of 2021 we released the In-Sight® 3D-L4000 vision system. A first-of-its-kind solution, the 3D-L4000 is the culmination of exceptional engineering work across our optics, vision tools, and customer experience teams. It brings powerful, patented technology to bear in a compact smart camera with remarkable 3D image acquisition, ease-of-use, and vision tools performance.

Connecting Customers to Industrial Internet of Things (IIoT) Data

For many years, manufacturers have envisioned a world where they could use factory floor data to improve their operations in real time. With the recent release of Cognex Edge Intelligence™ (EI™), customers can now access important data from connected Cognex devices across their manufacturing and logistics facilities.

Using the vast amount of data generated by Cognex systems, this software platform helps customers monitor system performance, manage devices remotely, prevent downtime, and boost productivity. With EI's powerful visualization tools, manufacturers across a range of industries can now access factory floor data instantly to identify device issues in any of their plants around the world and take corrective action faster.
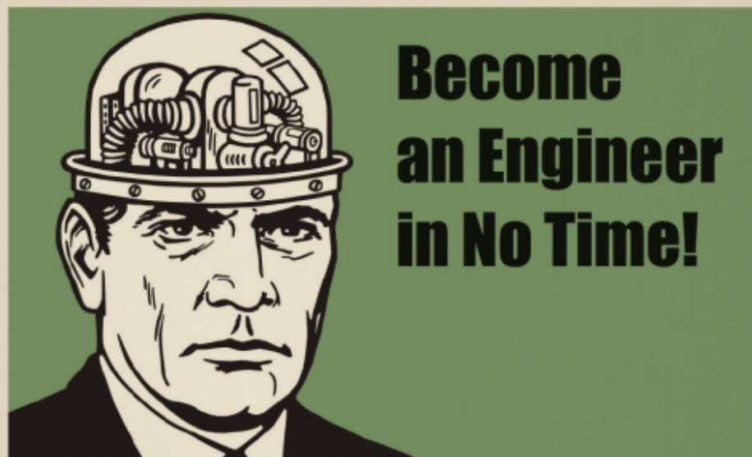
Maintaining Our Technical Edge

We have over 40 years of experience developing sophisticated software, together with unique hardware designs, custom-designed optics and illumination, and application knowledge. And we protect our intellectual property with more than 1,000 patents (issued and pending).

We are proud of our engineers and their innovation. From our DataMan® line of industrial barcode readers to our In-Sight® family of vision systems, our VisionPro® Deep Learning software, and our newly developed 3D vision tools, Cognex engineers create best-in-class products.

Their expertise allows us to provide vision tools that run faster, generate less heat, and run on lower-cost hardware

platforms, making them smaller, more energy-efficient, and easier to integrate than those of our competitors.

Cognex is committed to maintaining our position as a technology leader in machine vision, and each year we invest significantly in RD&E to achieve this goal. Our level of investment in RD&E for machine vision in 2020 was $131 million, an amount that we believe is unmatched by any of our competitors.

Culture Keeps Us Going When the Going Gets Tough

One of my top priorities is to make sure we continue to attract and retain the best Cognoids (as we call ourselves). As we celebrate our 40th anniversary in 2021, I am mindful that few technology companies make it this far—and even fewer achieve our level of growth and profitability.

I am especially proud of how Cognoids persevered in 2020. From meeting aggressive engineering deadlines to helping customers solve complex vision applications in the field, navigating through supply chain challenges, and executing the virtual launch for one of our most important products, Cognoids delivered exceptional results under challenging conditions.

Cognex's core values—putting customers first, striving for excellence, delighting in being different, and not stopping until a job is done right—have enabled us to attract, hire, and retain the best people. Cognoids have made our continued success possible.

Our Pioneering Spirit Remains

2020 was a difficult year for everyone, including Cognex. Nevertheless, thanks to our entrepreneurial culture and to our customers who value our technical edge, we were able to generate strong year-over-year revenue growth.

Now, as we chart our course forward, we look back on our company's humble beginnings for inspiration. We are reminded that our machine vision forbearers turned science fiction into reality—they made the future happen through solid business fundamentals, innovative thinking, and technology leadership.

Cognex's Leadernoids are prepared to do the same today.

By following these time-tested principles, and by building on our accomplishments of the past 40 years, I believe that we can continue to deliver high-quality revenue growth over the long term.

Let's keep making the future happen!

Robert J. Willett
President and
Chief Executive Officer

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A copy of the Annual Report on Form 10-K filed with the Securities and Exchange Commission, and copies of this report, are available free of charge upon written request to Cognex Investor Relations at the address above, or via online request at www.cognex.com/investor.

The Company's common stock is traded on The NASDAQ Stock Market LLC, under the symbol CGNX. As of January 31, 2021, there were approximately 650 shareholders of record of the Company's common stock. The Company believes the number of beneficial owners of the Company's common stock on that date was substantially greater.

Forward-Looking Statements

This report, including the Chairman's letter and the CEO's letter, contains "forward-looking statements" within the meaning of the Securities Act of 1933 and the Securities Exchange Act of 1934. For further information, please see the section entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations" in this report. A discussion regarding risks associated with forward-looking statements is included under the heading "Forward-Looking Statements." All information in this report is subject to change without notice.

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