HERMARY

Emily Lu

MARKETING AND COMMUNICATION MANAGER

How Machine Vision Plays a Role in Industry 4.0

Machine vision technology can scan objects while in production and provide real-time data analytics to help improve productivity and quality and cut waste.

Every industrial revolution in history has changed the world and the way we manufacture goods. The first industrial revolution introduced water and steam-powered machines that facilitated the mass production of goods. The use of electricity defined the second revolution by powering production lines and extending operating hours.

The development of electronics, computers and programmable logic controllers (PLCs) in the third industrial revolution gave rise to automated production lines and processes.

In the fourth industrial revolution, Industry 4.0, cyber-physical systems are optimizing manufacturing automation with enhanced data and machine learning.

As more businesses work to achieve higher productivity with better quality control, they're also looking for ways to slash unscheduled downtime. Piecemeal technological investments will no longer be sufficient to thrive in Industry 4.0, also known as smart manufacturing or digital transformation. A network of connected machines with real-time monitoring is the key to sustainable success.

With digital transformation increasingly relying more on machine learning, machine vision technology can play a key role in capturing the physical world and transforming it into networked, digital data. This data can be analyzed and processed in real time to help improve productivity, maintain quality standards and reduce waste so manufacturers can boost operational efficiency in continuous improvement.

The Potential

Industrial firms report as much as 10 to 12% gains in areas such as manufacturing output, factory utilization and labor productivity after they invested in smart factory initiatives. Some industries already are using 3D machine vision to identify opportunities for improvement.

A 3D machine vision scanner uses lasers to map the surface of an object and digitize it into a point cloud — a set of data points in space — to represent the 3D copy of the object. This data stream is continually transmitted downstream for processing by a computer, a PLC or a programmable automation controller (PAC). The output from such a device further determines the actions taken next in the automation process.

Companies that adopt machine vision in robotic guidance often see an exponential increase in its productivity, efficiency and quality. This can both

LISTEN TO THE PODCAST

12 Trends for Industrial Automation in 2022

In this Automation Chat podcast, "12 Industrial Automation Trends in 2022," learn about strategies and IIoT technologies manufacturers and producers are using on their digital transformation journey to improve agility, productivity and performance — especially to help deal with supply chain disruptions and labor shortages.

Theresa Houck, Executive Editor of *The Journal From Rockwell Automation and Our PartnerNetwork™*, explains AI, AR, machine learning, Single Pair Ethernet, digital twins and virtual simulation, hyperautomation and more. Learn about factors such as automatic remediation capabilities, containerization and software microservices.

Listen on your podcast app or on the web at **https://bit.ly/tj22trendspod**.

create new revenue streams for the robot OEM and additional value for their customers.

Machine Vision in Digital Transformation

3D machine vision serves several key roles in smart manufacturing operations.

1. Help Increase Competitiveness. In smart manufacturing, machines are connected to form an Industrial Internet of Things (IIoT) ecosystem. Integrating 3D machine vision with automation systems can improve the quality and quantity of data capture, making the smart factory a reality. This additional data is used in applications to verify quality, minimize waste and increase safety — all at a greater production speed.

Many industries are incorporating 3D machine vision for quality assurance roles.

2. Automate Quality Control. Delivering a consistently flawless product that meets clients' requirements is crucial for the company's reputation and financial success. In the age of Industry 4.0, quality control often can be enhanced by integrating machine vision to identify discrepancies in the products in real time.

Instead of waiting to manually test or examine batches of products after completion, the 3D scanner continuously monitors the products during production and prevents entire batches from being wasted as substandard.

Many industries are incorporating 3D machine vision for quality assurance roles. For example, in plants that manufacture goods with specific dimensions, such as paver blocks, lumber or tubing and pipes, 3D scanners can generate accurate real-time measurements of the product dimensions during each stage. Unacceptable variations in dimensions can trigger an immediate warning to the operator and shut down of the production line.

3. Increase Safety and Throughput. Traditionally, a production line has required human participation and judgement at critical steps. This can make consistent output and quality challenging to achieve, and sometimes, throughput can't be improved without risking safety. With Industry 4.0, machines can make decisions based on the data captured by the 3D machine-vision scanner. The result is a smart and safer plant that minimizes the use of labor while increasing the throughput.

The food industry is a key user of machine vision technology. For example, a meat processing facility equipped with a 3D scanner can identify the precise cut to be made by the band saw to the spinal channel. The automated process increases the throughput, because the cut can be done faster and more accurately, and the risk of human fatigue is removed. Most importantly, it eliminates any manual work done near the saws, reducing safety risks.

4. Optimize Resources. In smart manufacturing, resource management is more closely intertwined with a company's profitability. In many industries, machine vision can help

provide more precise processing, which reduces waste and demand on the planet's resources.

An automated system uses the digital copy created by the smart scanner to run through simulations that determine the maximal usage of the material. Over time, the accumulated data can be analyzed about the process control to further optimize the performance of the production lines.

Readily applicable for the sawmill industry, 3D machine vision has made automation of the log rotation process possible. The scanned data is processed to optimize the plank yield from a log, a process that traditionally relied solely on human judgement. The use of high-speed machine vision technology identifies off-sized boards immediately, verifying consistency in the manufacturing process while minimizing further material waste.

This means a sawmill can confidently implement process upgrades such as reducing target size or using thinner saw blades. Both enhancements have provided a significant upturn in waste reduction. For example, a typical sawmill can add up to $200,000 to the bottom line by reducing the target sizes by 0.01 in.

How Should Businesses Move Forward?

With possible benefits that can be realized from using machine vision in an industrial firm's digital transformation journey, companies can take further steps to gain a competitive advantage. ●

HERMARY Based in Coquitlam, British Columbia, Canada, Hermary is a Technology Partner in the Rockwell Automation PartnerNetwork™ program. The company designs and engineers machine vision technology, with more than 17,000 installations.