IndustryWeek MachineDesign IoT World Today

EXECUTIVE SUMMARY

Real World, Augmented Reality, Augmented Virtuality, Virtual Reality . . . How Many Realities Can You Have in Industrial Automation?

Simone Gianotti, Business Development Manager, Digital Offer Industry, USA, Schneider Electric

OCTOBER 24, 2018

KEY TAKEAWAYS

- We have entered a fourth industrial revolution, the Industrial Internet of Things (IIoT).
- Virtual reality, augmented reality, and other realities are a big part of this revolution.
- Reducing maintenance costs is one of the main use cases for AR.
- AR captures institutional knowledge and helps new employees get up to speed.
- Today the most common AR implementations involve goggles or tablets/smartphones.
- AR and VR are not passing fads. They are here to stay.

in partnership with

Life Is On Schneider Electric

Real World, Augmented Reality, Augmented Virtuality, Virtual Reality . . . How Many Realities Can You Have in Industrial Automation?

OVERVIEW

The fourth industrial revolution is well underway. It focuses on digital transformation and creation of the Industrial Internet of Things (IIoT). A key part of this revolution is technology that enables new realities—including virtual reality (VR), augmented reality (AR), and mixed reality (MR).

These new realities are already being applied in industrial settings and are poised to grow exponentially in the next few years. Common use cases include deploying augmented reality to dramatically decrease maintenance costs and rapidly expedite the learning curve of new hires.

Those companies that adopt these new technologies have the potential to realize significant financial benefits, to differentiate themselves, and to create competitive advantage.

CONTEXT

Simone Gianotti described what virtual and augmented reality are and discussed the role they are already playing in industrial automation.

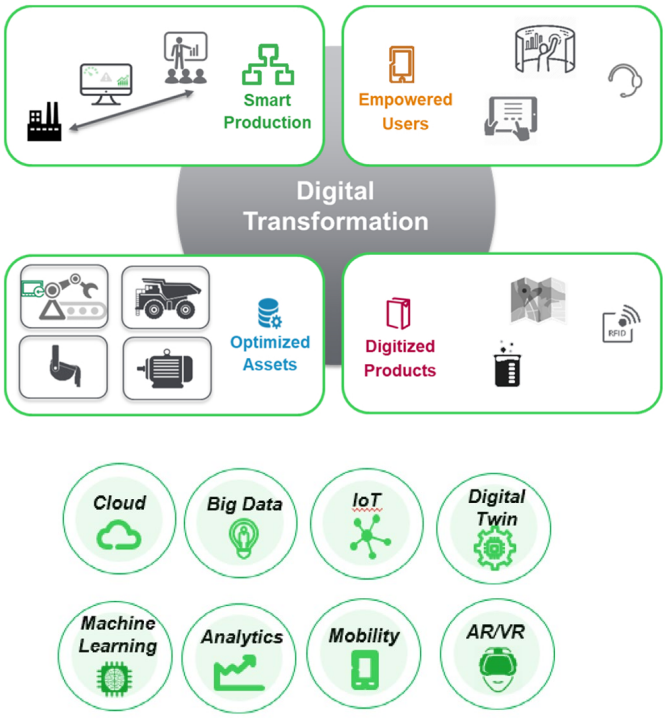
KEY TAKEAWAYS

We have entered a fourth industrial revolution, the Industrial Internet of Things (IIoT).

Humanity has previously gone through three industrial revolutions:

- First industrial revolution was based on steam power and mechanization.
- Second industrial revolution was driven by electricity and mass production.
- Third industrial revolution was based on computers, robotics, and the introduction of automation.

The fourth industrial revolution began in 2013. It links to digitization and communication to create a connected Industrial Internet of Things. Components of this industrial revolution include the cloud, big data, analytics, AR/VR, and more.



This fourth industrial revolution also involves digital transformation. It includes smart production, empowered users, optimized assets, and creation and use of digital products.

Virtual reality, augmented reality, and other realities are a big part of this revolution.

Throughout the first three industrial revolutions the only type of reality was the real reality. But this has changed, as technologies now enable new types of realities.

Real World, Augmented Reality, Augmented Virtuality, Virtual Reality . . . How Many Realities Can You Have in Industrial Automation?

New Types of Realities	
Virtual Reality (VR)	– VR is a complete immersion experience that puts people in a fully digital world and shuts out the physical world. – An example is a game where participants use a light saber. (See video)
Augmented Reality (AR)	– AR is an overlay of content on the real world, but the real-world content and the computer-generated content *are not able* to respond to each other. An example is Pokémon Go.

AR and VR are being used in industrial automation today in two main areas:

- **Immersive meetings.** This is an upgrade to normal Skype meetings. Participants in virtual meeting rooms will be able to see the avatars of other participants around them.
- **Training.** VR as a training tool is becoming more common. It provides a safe training environment that mimics what an employee would experience in the real world. (See this video of VR used for training.)

New Types of Realities	
Mixed Reality	An overlay of computer-generated content on the real world. The real-world content and computer content *are able* to react to each other in real time. An example from a televised football game is the computer-generated yellow first down line that appears on the screen (but not on the actual field). 
Augmented Virtuality	– Predominantly virtual space, where real-world elements can be dynamically integrated. An example is a VR experience that involves other senses like touch or smell.

The lines between augmented and mixed reality are blurred. For simplicity, people in industrial automation refer to all mixed and augmented reality as "augmented reality."

The four most common ways in which industrial automation uses AR are:

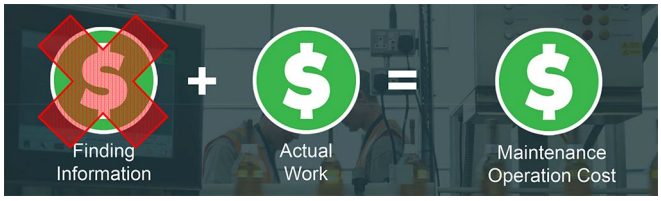
- **Variables monitoring** to show how well assets are working. Includes key performance indicators (KPIs), assets status, warnings, and alarms.
- **Maintenance** documentation and tasks. AR can be used as a documentation repository and can store step-by-step maintenance processes and procedures. It can also enable safe maintenance solutions by virtual access to a system that would otherwise require strict safety processes.
- **Operation** using standard sequences that can be visualized to drive quality, efficiency, and accountability.
- **Training** through how-to-videos and operational sequences that can be followed safely and securely.

Reducing maintenance costs is one of the main use cases for AR.

AR addresses one of the biggest maintenance challenges companies have: reducing the time and cost spent on the maintenance process.

Today, before maintenance is performed on a piece of industrial equipment, significant time must be spent finding information about the equipment, such as electrical schematics that should be attached to the equipment door but have been removed. By offering these schematics in AR, workers no longer waste time hunting down schematics and can, instead, start working on problem solving. This use of AR can potentially reduce maintenance costs by 50%.

Real World, Augmented Reality, Augmented Virtuality, Virtual Reality . . . How Many Realities Can You Have in Industrial Automation?



> Augmented reality can reduce by a lot and potentially completely eliminate the time wasted looking for information.
>
> *Simone Gianotti*

AR captures institutional knowledge and helps new employees get up to speed.

Industrial workforces are aging and workers are retiring. When workers retire, their knowledge leaves with them. A challenge is capturing this knowledge and transferring it to new hires. Augmented reality provides a solution.

> Augmented reality cannot do much about aging, but can help with the transfer of knowledge.
>
> *Simone Gianotti*

One Schneider Electric customer is solving this problem by providing cameras to its experienced maintenance people. Every time an experienced person maintains equipment, they record a video. These videos are compiled in a "how to" database. Videos in the database can be accessed as needed. Also, the company has linked alarm conditions to associated videos. When a specific alarm occurs, AR can immediately find the right content for an employee to troubleshoot and solve the problem.

AR solutions can significantly decrease the learning curve, providing new employees with the information they need when they need it.

Today the most common AR implementations involve goggles or tablets/smartphones.

When implementing AR, today's users are most likely to use a tablet/phone or goggles. The needs of the business and users, as well as costs, will typically drive which AR solutions are put in place.

Pros and Cons of AR Implementation Solutions

	Pros	Cons
Goggles  (see this video of AR using Microsoft HoloLens)	– **Hands free** allows user to perform tasks with hands while looking at information in real time. – **Easier to use for remote assistance.** Built-in headphones/microphone allow user to talk with a remote operator; camera allows remote operator to see what user is seeing.	– **Safety concerns** as some goggles impair lateral vision, and real-time information or videos in direct line of sight can be distracting. – **Ergonomics;** head movements are often awkward, which can cause discomfort. – **Cost** can be prohibitive at $3,000 to $5,000.
Tablet/smartphone  (see this video)	– **Safety.** The device needs to be put down when performing a task, which allows worker to focus on the task at hand. – **Cost** can be low, especially if refurbished devices are used.	– **Not hands free,** which means device must be put down to perform an operation. – **Remote assistance is more complicated.** User needs to hold tablet in the right place to show remote operator what they are seeing.

Real World, Augmented Reality, Augmented Virtuality, Virtual Reality . . . How Many Realities Can You Have in Industrial Automation?

AR and VR are not passing fads. They are here to stay.

AR and VR are still early in their adoption phase for industrial automation, but research indicates that the VR and AR markets will grow significantly over the next five years.

Projected VR and AR Markets ($ billions)

	2018 (actual)	2023 (projected)
VR	$7.90B	$34.08B
AR	$11.14B	$60.55B

In addition to the use of the new realities by end users, there are also significant opportunities for original equipment manufacturers (OEMs). OEMs can leverage AR for internal production lines, reaping the same benefits as end users in optimizing machine production, minimizing maintenance costs, and increasing profitability.

Jumping into AR and VR also allows OEMs to differentiate from competition by selling innovative services and technologies. And, providing these new technologies helps increase customer satisfaction.

> Both VR and AR are going to become more important in the market. This is the right time to take the first step and become one of the early adopters.
>
> *Simone Gianotti*

ADDITIONAL INFORMATION

To learn more about industrial automation and opportunities in AR and VR, contact Simone Gianotti at simone.gianotti@schneider-electric.com.

Also, connect with Simone about visiting Schneider Electric's Lexington Smart Factory in Lexington, Kentucky.

BIOGRAPHY

Simone Gianotti

Business Development Manager, Digital Offer Industry, USA, Schneider Electric

Mr. Gianotti's professional experience started as an application engineer for Motion and Automation, working with customers on the factory floor to help develop and commission the software for machines in the material working, material handling, and packaging segments. Moving into a position as a Trainer brought Simone to acquire international experience traveling to Europe, Asia and eventually to America where he moved in 2009.

As the next step, Mr. Gianotti moved to Product Management and Marketing, first as responsible for the Safety offer and then as Offer Manager for Motion. As Motion Product Manager, Simone has witnessed the development of the first Smart Machines, and joined the Schneider Electric's Global group in charge to develop that concept for the Machine Builders. The activity as a member of the Smart Machine group brought Simone to explore more and more the IIoT and the Industry 4.0 worlds, leading to the new role within Schneider Electric as Business Development Manager for the Industry Digital Offer for the US.