Augmented Reality and Wearable Devices

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www.iconics.com

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Contents

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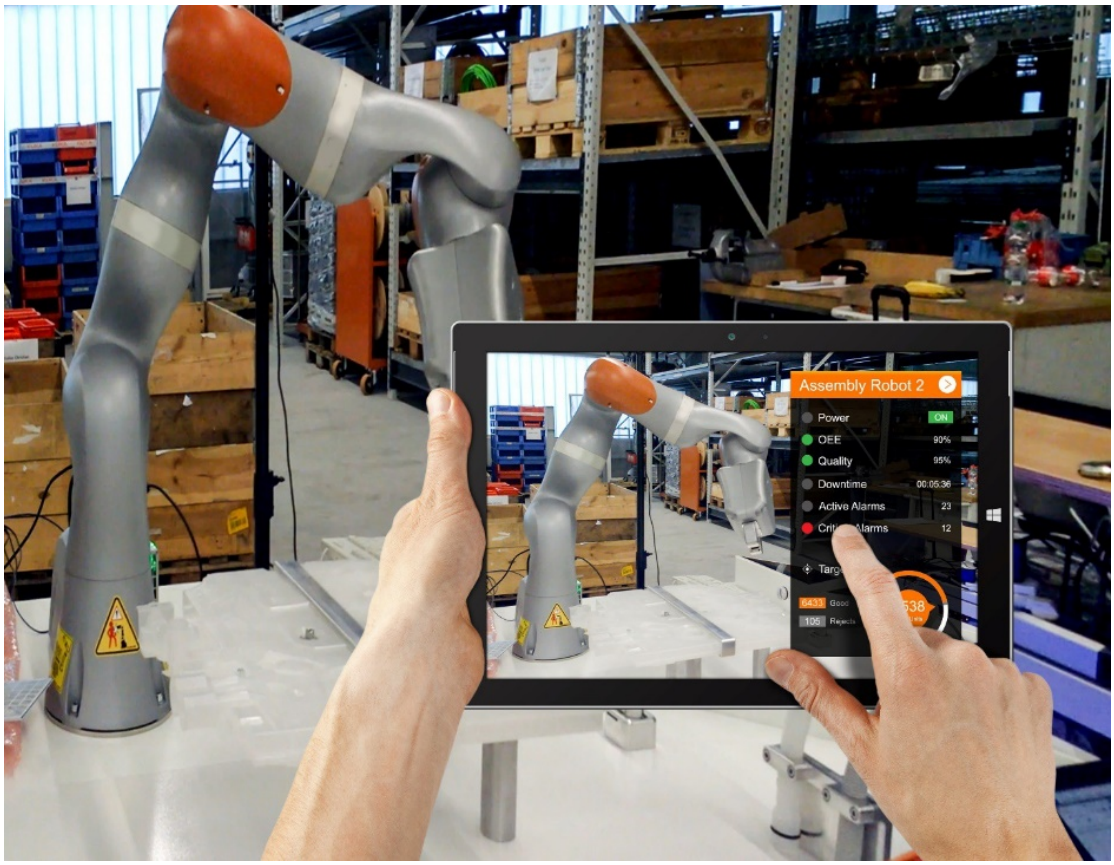
Overview

As mobile devices have become ubiquitous in industry and society, hardware and software vendors have begun creating new applications for this technology, including wearable devices and augmented reality. Wearable devices, such as Microsoft's HoloLens self-contained holographic computer and RealWear's hands-free head-mounted tablet, integrate directly into users' lifestyles and workflows. A specific application for these wearable devices (e.g.) is augmented reality, which superimposes virtual objects known as holograms within a physical environment.

Wearable devices and augmented reality fit well into ICONICS' product ecosystem, which already provides mobile-friendly solutions with its MobileHMI™ apps, touch input methods, and location services. Large technology corporations and more specialized wearables companies have invested a great deal of resources into this emerging hardware, creating a favorable forecast for this industry. As this technology advances, ICONICS will continue to empower users by embracing cutting-edge software and hardware integration within its product suite.

Users can incorporate this new technology into several different types of existing products and solutions. Furthermore, this advancement benefits a variety of industries, including: manufacturing, water and wastewater, and oil and gas. These scenarios demonstrate how users will achieve better results and improved ROI.



Today's Augmented Reality Capabilities

ICONICS has long been at the forefront of innovation in user interaction and experience. From its early days of emphasizing iconography in SCADA displays to recent advancements with HTML5 technology, ICONICS has put the user first and has cultivated an engaging and seamless experience.

ICONICS introduced the world's first 3D Holographic Machine Interface (HMI), using Microsoft's HoloLens self-contained holographic computing device, adding to its wide range of augmented reality and mobile capabilities. The company has integrated the visualization of real-time and analytical data and KPIs in 2D and 3D holograms. When used with ICONICS AnalytiX solutions, including energy management and fault detection and diagnostics (FDD), and Hyper Historian data historian, the additional insight provided from the HoloLens/ICONICS HMI solution can be especially time-saving and useful for maintenance operations and field service personnel, who can benefit from such easily accessed "on the spot" information.

Digital Twins

ICONICS and Microsoft, through the combination of holographic computing hardware and holographic machine interface software, have fostered the concept of a "digital twin", where data from sensor-connected equipment can be accessed anywhere (often over the Internet of Things [IoT]) to create a real-time, virtualized model for monitoring and control. Using a digital twin provides advantages such as improved project collaboration and virtual access to physically hard-to-reach areas. At Hannover Messe 2017, ICONICS worked with Microsoft and Comau on a demonstration of a HoloLens, integrated with ICONICS HMI software, controlling a Comau Racer 3 robot. The digital twin concept is being used increasingly throughout manufacturing organizations worldwide. When applied in conjunction with analytics tools, such as ICONICS AnalytiX suite, it can also help to reduce costs related to production, energy use, and maintenance.

Working with Industrial Wearables

ICONICS has announced the integration of its holographic machine interface (HMI) software technology with head-mounted tablet (HMT) industrial wearables from RealWear, a Silicon Valley company building the world's first REAL hands-free and fully rugged head-mounted tablet solution for connected industrial workers. RealWear, Inc., headquartered in Milpitas, CA, has gathered a team of seasoned executives and human factors experts who hail from the ultra-rugged smart phone, smart glasses micro display and industrial augmented reality spaces. Together, the company engineers wearable hardware, software, cloud and AI solutions for enterprises in heavy industry, envisioning the future of field work every day, but also "keeping it REAL" by combining proven technology with expert execution.

Featuring an intuitive, 100 percent hands-free interface, RealWear's HMT-1™ brings remote video collaboration, technical documentation, industrial IoT data visualization, assembly and maintenance instructions and streamlined inspections right to the eyes and ears of workers in harsh and loud field and manufacturing environments.

Currently Supported Hardware and Platforms

ICONICS designs cross-platform software, providing users the flexibility to apply solutions within an existing infrastructure. ICONICS mobile technology leverages HTML5 capabilities to generate displays that can be viewed on any device (desktop, tablet, and smartphone) providing a seamless, universal user experience. ICONICS develops software on the technological frontier, incorporating augmented reality and wearables, and continues its commitment to developing products on emerging platforms such as smartwatches and headsets.

Supported Features in ICONICS Software

ICONICS has expanded its software offerings to support mobile devices, including smartphones, tablets, and touchscreen monitors. As a result, its products have evolved to support the distinct needs of the mobile ecosystem. For example, to prevent unintended interactions, ICONICS has added support for "safety zones" on mobile displays. Users tap on these areas in order to interact with a sensitive part of the display. To increase the range of usable gestures, including the ubiquitous "pinch to zoom" motion, ICONICS displays support multi-touch input.

Recognizing the potential for mobile displays to be used anywhere, ICONICS has incorporated a variety of location services within its software. These range from object identification using barcodes and QR codes, to environmental awareness using near-field communication (NFC) and global positioning system (GPS) technology.

ICONICS 3D technology allows users to place high-fidelity models in their geographical context, leveraging real-world elevation data within the automated terrain generator. This combination of easily adjustable services, available from a central location, provides ICONICS users with a nearly unlimited range of tools for interacting with their environment.

Applications of Augmented Reality

Mobile-friendly technology allows operators within a wide variety of industries to have more flexibility when interacting with their systems. The tools within ICONICS software allow users to customize a set of features that best suits their needs. For example, systems integrators might use GPS capabilities to load relevant information based on a detected location. A manufacturing company might use NFC to identify specific pieces of machinery, or a supplier might use barcodes to identify anomalous batches in an SPC system.

The range of available hardware has created new opportunities for using location-aware tools. Managers might subscribe to alarm notifications on their smartwatches, allowing them to take appropriate action from anywhere. Mobile devices become mobile workstations, used in the field and in the control room alike for both supervisory control and data acquisition.

For example, tablets become a cost-effective way to replace aging mounted displays while still retaining the ability to use ICONICS custom commanding such as "load display," "load KPIWorX dashboard," "set global alias," and "write value." Managers can monitor displays on their existing smartphones, further driving efficiency without any upgrade to infrastructure.

Industry Outlook

While large corporations and small businesses have already made significant contributions to the augmented reality and wearables markets, these industries are poised for substantial expansion as more advanced devices are adopted.

Current Markets

Like most technology markets, the wearable device and augmented reality markets have exploded in recent years as their support has become more common. Independently, both wearable devices and augmented reality have received funding from research and development departments in several large technology corporations, including Microsoft, Amazon, Google, Facebook, Apple, Nokia, Samsung, and Sony. Wearables have also benefited from newly-created niche markets based on this hardware.

More specialized companies, such as RealWear, Daqri, Vuzix, and Innovega, have implemented devices leveraging this new technology, enabling enterprise users to improve their productivity and situational awareness.

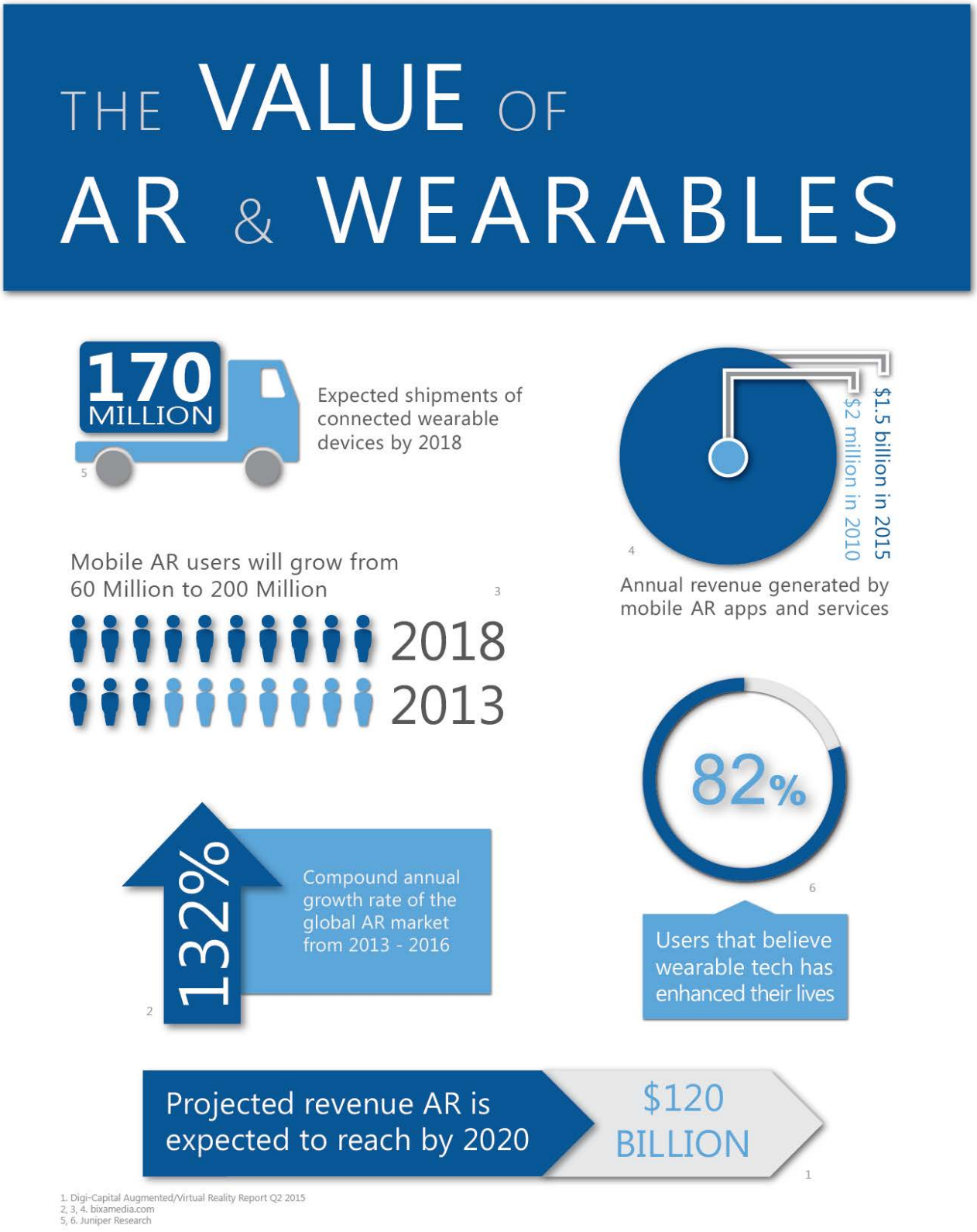
Just as market influence over wearable technology and augmented reality has increased significantly, so too have mobile devices housing this technology become increasingly powerful year after year. Hardware manufacturers continue to innovate, giving these devices additional computational power (faster CPU and GPU units) as well as more memory (increased onboard RAM). Such rapid improvements have made it easier for investors and inventors alike to accomplish tasks in wearable and augmented reality scenarios using the hardware available today.

Both wearable devices and augmented reality will command broad market appeal. Currently, nearly one in three mobile users interacts with augmented reality features. The majority of these applications utilize location services or similar emergent augmented reality technologies, and the expanding adoption of this platform will further encourage its progression. The magnitude of this advancement will establish a new content channel that a variety of industries can use to reach their customer bases for advertisements, training videos, and demos.

Market Projections

Overall projections for both wearables and augmented reality mirror similar rapidly growing technologies. While the last ten years have seen increased growth in users, applications, investments, and innovation, projections for the next five years trend towards a proliferation in all categories by as much as an order of magnitude or more in various sectors. The infographic above illustrates how economic demand, technological advancements, and sheer investment capital serve as the impetus for these developments.

As collaboration software has become ubiquitous, wearables and augmented reality are primed to become indispensable collaboration components of future business and industry environments. While social media and entertainment corporations such as Facebook have committed massive investments in wearables and augmented reality, conferencing solutions from Citrix, Cisco, and Microsoft are striving to adopt these technologies and rapidly acquaint users with the advantages they provide. The rise of wearables will allow workers to interact more naturally with their colleagues using collaboration software and will transform augmented reality into a cooperative platform.

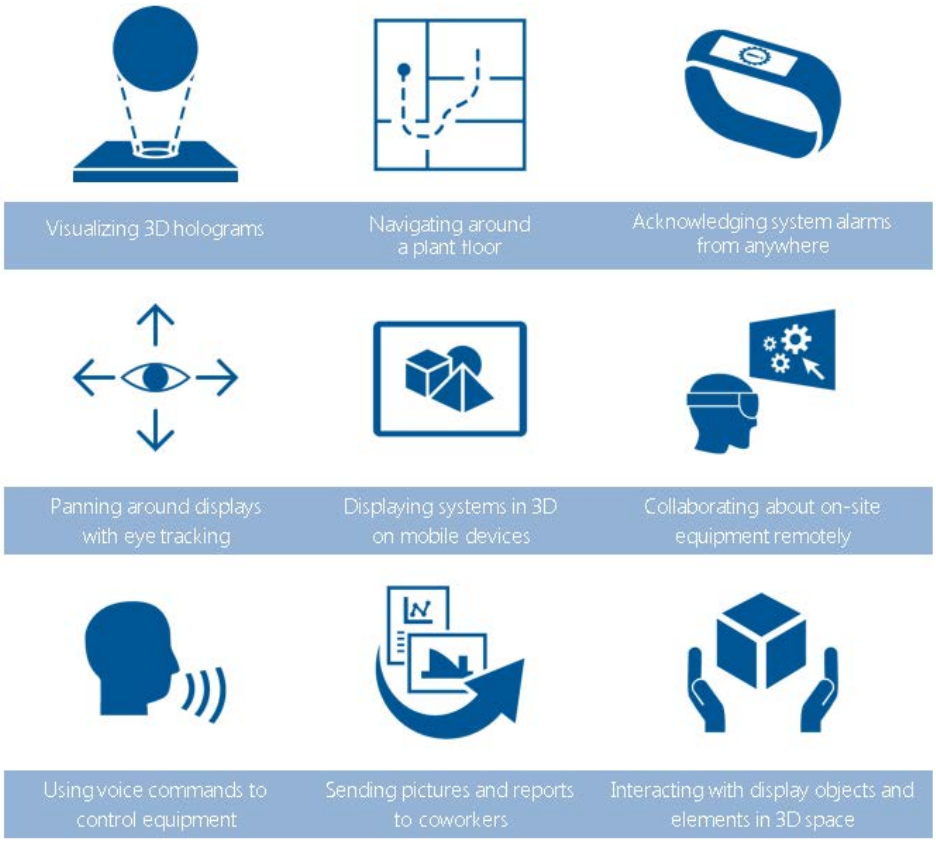


Augmented Reality Using Wearable Devices

ICONICS continues to develop creative solutions leveraging nascent technologies. Current and future industry challenges will be overcome utilizing proactive methods.

Devices on the Wearable Frontier

ICONICS envisions the next generation of user interaction emerging in wearable technology, particularly smartwatches and smartglasses, such as the Apple Watch and the Microsoft HoloLens. Such devices will not only streamline the user experience by increasing ease of access, but also minimize intrusiveness by eliminating barriers to information and system control. Just as touch and voice input have provided useful supplements to traditional user interface technologies, so too will wearable technology and augmented reality enhance interaction and collaboration. These scenarios will further leverage existing augmented reality technologies as ICONICS continues to integrate developing features with emerging hardware.

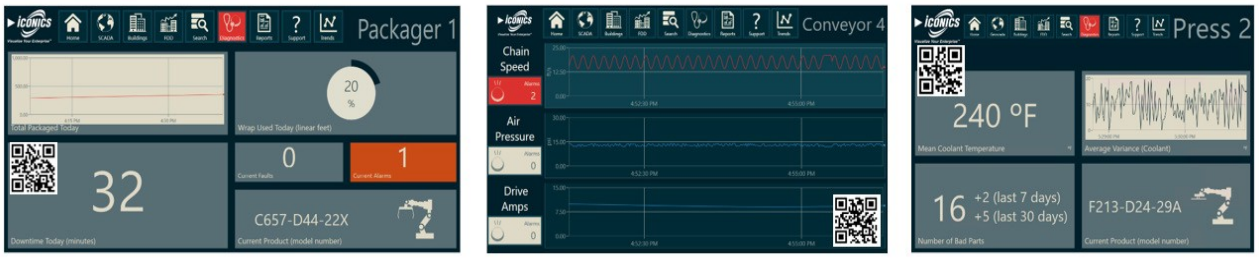


Location-aware Use Cases

People in various industries can use ICONICS' current solutions to assist in a variety of challenges while still being poised to utilize developing technologies and hardware.

Machine Monitoring in Manufacturing

The manufacturing industry continues to use increasingly complex and dynamic systems, so machine monitoring based on QR codes would allow for more natural interaction and efficient mitigation, as demonstrated in the following GraphWorX64 displays:



A floor manager wishes to examine the downtime of a packager. The manager scans the QR code on the packager, which renders the corresponding mobile display. This allows the manager to inspect multiple machines quickly from anywhere on the floor and to report any concerns or updates.

Plant Historian Logging in Water and Wastewater

Since water and wastewater facilities continuously monitor the status of their processes to identify tendencies and anomalies more efficiently, these plants can benefit from using NFC to view associations between trends and individual pieces of equipment.

An operator examining the plant (above left) might move into the vicinity of a specific reactor or piece of equipment such as a clarifier. The operator can view historical trends specific to that clarifier (above right) and can place these trends in the context of the entire system.

Based on this information, the operator can address any potential issues and can communicate the associated findings to colleagues.

Geospatial Awareness in Oil and Gas

Industries using widely-distributed systems, such those found in oil and gas industries, can manage their large- scale infrastructure more effectively using location-aware features. As the operator enters the main compound, the arrival is logged along with time and location. The main display for the entire compound is then displayed on the operator's device. The operator then travels to a specific site, such as a storage facility. Once at this location, the operator's device will use its GPS sensor to recognize the new location and portray the corresponding display.

This location-aware updating process will allow the operator to interact with the equipment at that site and provide feedback about its status for colleagues to monitor. Once done at the storage facility, the operator travels to a different site, such as the pump facility (shown on the bottom left). The updated GPS signal triggers an update on the operator's device, showing yet another display with details about the facility's pumps (shown on the bottom right). Once the operator leaves the facility, the check-out process occurs automatically. Throughout the process, the operator's movements are logged within an event-tracking system, enabling managers to examine audit trails that include each command's geographic context.

This process is particularly beneficial to the company when hosting a third party, such as an inspector, to examine the facility. The company needs no new hardware, system integration, or relocation maintenance since this operation is based exclusively on GPS location.

Harness These Future Technologies Today

With strong technical foundations and extensive market support, wearable devices and augmented reality each show great promise as the industry continues to adapt this hardware into present-day workflows. Recognizing this trend, ICONICS has already integrated several key components of this technology, including location-aware services and mobile device support, into its product suite. Given that these markets will continue to expand over the next few years and beyond, ample opportunities exist for a variety of industries to develop efficient, intuitive uses of these tools, increasing safety, reliability, and customer satisfaction in the process. ICONICS is proactively integrating these technologies into its offerings while leveraging the momentum of the market expansion.

Founded in 1986, ICONICS is an award-winning independent software provider offering real-time visualization, HMI/SCADA, energy management, fault detection, manufacturing intelligence, MES, and a suite of analytics solutions for operational excellence. ICONICS solutions are installed in 70 percent of the Global 500 companies around the world, helping customers to be more profitable, agile and efficient, to improve quality, and to be more sustainable.

ICONICS is leading the way in cloud-based solutions with its HMI/SCADA, analytics, mobile and data historian to help its customers embrace the Internet of Things (IoT). ICONICS products are used in manufacturing, building automation, oil and gas, renewable energy, utilities, water and wastewater, pharmaceuticals, automotive, and many other industries. ICONICS' advanced visualization, productivity, and sustainability solutions are built on its flagship products: GENESIS64™ HMI/SCADA, Hyper Historian™ plant historian, AnalytiX® solution suite, and MobileHMI™ mobile apps. Delivering information anytime, anywhere, ICONICS' solutions scale from the smallest standalone embedded projects to the largest enterprise applications.

ICONICS promotes an international culture of innovation, creativity, and excellence in product design, development, technical support, training, sales, and consulting services for end users, systems integrators, OEMs, and channel partners. ICONICS has over 350,000 applications installed in multiple industries worldwide.

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