



AI

WHITEPAPER

How **AI and IoT** will change **industry** as we know it

Connected devices—the Internet of Things (IoT)—have already profoundly changed how we interact with the world around us. Smart home devices let us change the temperature, preheat the oven or unlock the door from the couch—or the other side of the world. Smartwatches and other wearables are changing healthcare, allowing patients and caregivers to track vitals from their smartphones. Businesses, too, have embraced the exponential potential of interconnected devices. If an aspect of business operations can be measured, tracked or otherwise controlled, chances are high that an IoT device is involved.

Now, the business world stands on the edge of a much bigger transformation. Businesses are finally solving the classic Big Data problem: how to find actionable signals in the deluge of IoT data noise to unlock the insights that will drive the future of smart business - by accelerating the adoption of IoT devices along with the advance of sophisticated and practical artificial intelligence (AI) technologies.



IoT revolutionizing retail

One needn't hunt down obscure, one-off use cases to see real-world examples of how IoT and AI are coming together to drive transformational change and create new possibilities in the business world. In the retail world, IoT is being used across every aspect of business operations—and the biggest brands in the world are staking their future on it.

IoT technologies are powering a complete overhaul of retail supply chains—more critical than ever in the face of ongoing global disruptions that have left retailers with bare shelves and empty warehouses. Real-time monitoring of every node in a complex supply chain enables retailers to accurately track, predict and plan for future demand. Smart shelves connect the feedback loop—not just ensuring shelves remain stocked, but triggering automatic ordering workflows for intelligent inventory management. Connected technologies across the retail floor drive smarter facility management, helping retailers deliver consistently outstanding in-store experiences. Tracking technologies are also helping retailers understand shoppers' in-store behaviors, as well as allowing them to control traffic (for public health purposes) and steer traffic (for marketing and merchandising purposes). Finally, linking smart stores with customers' smartphones—and even VR and AR technologies—is allowing the most innovative retailers to create immersive, personalized shopping experiences.



Making hyper-personalized healthcare possible and practical

Another set of front-and-center IoT use cases revolve around the delivery of remote healthcare and virtual medicine, which has taken off since the pandemic began in 2020. Wearable devices make it possible to monitor patients remotely with an incredible level of detail, giving clinicians real-time visibility of vital signs, trends, etc. Those same IoT insights are usable even when care is delivered in-person: Clinical staff can review historical wearable data to identify trends, warning signs and more, delivering personalized care based on comprehensive personal health data rather than isolated observations. From a broader public/population health perspective, IoT technologies are giving healthcare organizations and researchers tremendous troves of data to better understand health conditions, develop and evaluate new drugs and treatment options, and deliver prescriptive recommendations to each individual patient.



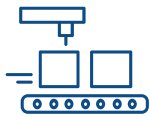
Accelerating ESG and net zero initiatives

As Environmental, Social and Governance (ESG) and Net Zero initiatives have become essential components of every business, IoT technologies are enabling new levels of visibility and revealing greater insights to guide, support and prove these efforts. The World Economic Forum estimates that 84% of IoT deployments today relate in some way to UN Sustainable Development Goals (SDGs). Connected supply chain insights go beyond solving disruptions and availability issues—real-time monitoring can give organizations granular visibility into the carbon footprint of goods and materials as they move along their journey. Smart buildings are filled with sensors and connected technologies that drive their HVAC and lighting systems. These connected insights are feeding AI-based systems that can dynamically adjust and even predict variable usage patterns, thus automatically optimizing to minimize resource usage. Other workplace monitoring technologies support safety and wellness—tracking workplace conditions and worker behaviors to identify risks, optimizing scheduling to avoid burnout, and even helping root out non-compliant employment practices.



Blurring lines between physical and digital

Across multiple segments, intelligent, connected ecosystems are enabling the creation of digital twin environments. Businesses are using digital twinning to develop, test, train and plan for the future. This 'Phy-gital' world has proven tremendously valuable in industries like manufacturing, construction, mining and utilities—where capital-intensive infrastructure and higher-risk labor limit the ability to test and optimize in the real world. Digital twinning, however, is now being used by retailers and other segments as well. Moreover, the most innovative companies are combining digital twinning with VR and AR technologies to bring the promise of the metaverse to the business world, enabling workers to train, test and optimize workflows in a fully-immersive, digital environment.



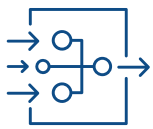
Heavy industries leading the way in IoT adoption

While they don't get the same attention as consumer or public-facing IoT use cases, innovative companies in labor-intensive heavy industries have been at the forefront of IoT adoption, embracing the power of connected devices and monitoring technologies to not only increase efficiency, but also protect quality and improve worker safety. These interconnected devices can take many forms, including sensors, wearables, maintenance systems and site maps.

- Temperature sensors help maintain consistency in the manufacturing process and ensure that heating and cooling elements like airflow and water are working properly.
- Tri-axial accelerometer sensors monitor vibration on rotating equipment, and take measurements including velocity, acceleration and displacement.

- Torque sensors, when used in combination with vibration sensors, can help monitor motor conditions and address potential issues before damage occurs to expensive machinery.
- Pressure sensors can be found in hydraulics, fluid delivery lines and injection molding equipment.
- Surveillance data, i.e., security/ thermal imaging cameras and similar devices can provide valuable insight about how workers move through a job site.
- Wearables for construction and manufacturing workers can include things like hard hats equipped with sensors to detect impact and respirators that record how long a worker was exposed to a potentially harmful chemical.

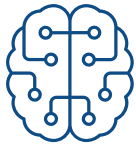
This list is by no means exhaustive, but it's easy to see how IoT applications can quickly wrap around—and transform—the entire production process, providing valuable data along the way.



A deluge of IoT data presents a noise problem

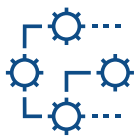
IoT provides data, and a lot of it. However, this data doesn't mean much without the means to analyze it and apply the knowledge gleaned. Moreover, many data points derived from IoT devices don't neatly fit in the rows and columns of an easily understandable spreadsheet. In fact, data at this scale is often functionally impossible to manage from a traditional spreadsheet. Rather, this unstructured data—for instance, security camera footage or torque sensors—doesn't provide much insight in isolation.

Even when savvy individuals come up with ways to aggregate it, it's often a full-time job just to keep the data up to date—let alone uncover predictive or prescriptive insights in real-time, though it hasn't slowed the adoption of IoT devices, this data noise problem has limited the real-world results that businesses can derive from IoT devices on their own. More businesses recognize that IoT devices are only one half of the business transformation equation. An equally important part of that calculus is how data is analyzed to provide meaningful business insights.



AI promises to make sense of unstructured data

Even the most brilliant human mind cannot possibly process the IoT data flowing into many companies today. But modern AI technologies can easily digest a near-infinite amount of data in real-time. Perhaps more importantly, AI can make sense of the unstructured data garnered throughout your organization's production processes. An AI model can analyze a security camera footage feed at a job site and determine whether a worker is wearing proper protective equipment. Or, in a more complex use case, an AI model can correlate external data sets like weather records with employee attendance and IoT sensor data to predict what conditions make a job site most efficient. This makes AI the fundamental component of IoT.



Purpose-built platforms to deliver meaningful insights through AI

AI technologies provide immense computing and analytical power, learning and adapting to subtle changes and growing continually smarter over time. But they still require training—and they still need to resolve specific questions or issues.

This is where standalone/add-on AI solutions and generalist AI platforms have fallen short of their promise: Most organizations don't have a large team of data scientists on staff, ready to custom-build and train AI models to answer their unique business questions.

That's why today, the most exciting innovation centers on integrated platforms combining purpose-built AI models with industry-specific IoT technologies. These purpose-built platforms are designed to give businesses everything they need to hit the ground running with digital transformation: Focused, fit-for-purpose IoT technologies that are built to function as a seamlessly integrated ecosystem with out-of-the-box analytics capabilities aimed at the metrics and questions that businesses in a specific industry care about most—from worker safety in a construction company, to production efficiency in a manufacturing organization; and sophisticated AI models that are pre-trained to understand unstructured data and identify relevant insights.



Transforming insight into action

Just as data goes to waste without analysis, AI modeling and analysis of complex unstructured data sets derived from IoT sensors have no value on its own—it must be put into action to inform and transform business processes. But what does that mean from a practical perspective?

It's not enough to just register that a worker isn't wearing their personal protective equipment or that job site productivity plummets on days when the thermostat tops 100 degrees. The next step is to generate an alert so that the worker in violation of a personal protective equipment policy can be addressed before an incident occurs, or to increase staffing or stretch project timelines should a heatwave pop up on the long-range forecast. Better yet, use the knowledge you've gained to seasonally schedule your largest projects to ensure the highest levels of efficiency on the projects that matter most.

This is what the future of blended AI and IoT looks like—and that future is already here with the Insights NxT Platform from LTIMindtree. The Insights NxT platform is designed to deliver instant, out-of-box- connectivity for all your IoT assets, without the hassle that normally accompanies that process. The NxT platform uses industry-specific AI modeling to turn that IoT data into meaningful insights, centralized in a single, easy-to-understand dashboard. And, most importantly, the NxT platform comes with pre-built intelligent automation capabilities that empower businesses to not just extract IoT insights, but turn them into usable fuel to power smarter operations and true business transformation.

This isn't the type of information you gather at the end of a quarter, present to leadership, and never revisit again. This is active data with prescriptive insights that can—and should—inform the way you structure your workflow, workforce and long-term strategic initiatives.



The smart future of the interconnected industry

Like many innovative technologies, IoT and AI began as immensely promising concepts that were largely limited by their respective barriers to real-world application. We've heard the hype around the potential of IoT data for the last decade, but that value was locked within the torrent of unstructured data. Likewise, the capabilities of AI have been limited by the challenge of training algorithms. But today, these technologies are coming together in integrated platforms with fit-for-purpose workflows and applications—making it possible and practical for businesses of all sizes and across a range of industries to fast-track their digital transformation.

These next-generation platforms will define and drive the future of industry, creating connected and intelligent factories and job sites. Smart production equipment, wearables and connected monitoring devices will automatically detect subtle anomalies and inefficiencies—and intelligent automation will automatically trigger remedial actions that not only drive operational efficiency, but improve service/work quality and help to create safer workplaces. Rather than replacing workers, this intelligent, AI-driven automation will help workers in many of today's most demanding jobs to reduce physical burdens and safety risks—and free more time to focus on high-value, high-touch, highly engaging tasks only a human can perform.

AI and IoT will change industry as we know it. Are you ready to witness this impact in your organization? Let's talk.

LTIMindtree is a global technology consulting and digital solutions company that enables enterprises across industries to reimagine business models, accelerate innovation, and maximize growth by harnessing digital technologies. As a digital transformation partner to more than 700+ clients, LTIMindtree brings extensive domain and technology expertise to help drive superior competitive differentiation, customer experiences, and business outcomes in a converging world. Powered by nearly 90,000 talented and entrepreneurial professionals across more than 30 countries, LTIMindtree—a Larsen & Toubro Group company—combines the industry-acclaimed strengths of erstwhile Larsen and Toubro Infotech and Mindtree in solving the most complex business challenges and delivering transformation at scale. For more information, please visit www.ltimindtree.com.