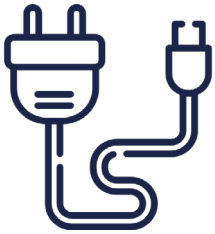

An Introduction to IoT: **Getting Started With the Internet of Things**

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Contents

INTRODUCTION

What is IoT?

The Internet of Things (IoT) refers to a system where devices connect via sensors, software and other technology to exchange data over the internet.

IoT represents the monitoring and control of everyday objects such as thermostats, lights, doors, smart home appliances and vehicles. Sensors can collect data such as temperature, humidity, motion and locations, analysing this to provide insights into activity. Some common examples of IoT devices include:

- **Smart home devices such as lights and cameras that can be controlled via apps**
- **Connected vehicles that can provide diagnostic information and location tracking**
- **Industrial machines such as doors with sensors that track performance, energy use and need for maintenance**

IoT embeds sensors into physical objects that were previously disconnected from the internet. This allows these items to generate data that can be analysed and shared. In industrial settings, IoT is used for remote monitoring and control, ensuring smooth operation and early detection of product malfunctions.

Predictive maintenance is a key term when it comes to IoT. In this case, industrial equipment such as machinery can be equipped with sensors to monitor performance in real-time. Any abnormalities and signs of wear and tear can be detected, so maintenance teams can schedule repairs before equipment failure occurs. This improves first-time fix rates (FTFR), reducing costs for companies and making repairs more efficient.

In essence, IoT streamlines efficiency across various industries, takes the pressure off manual labour and prevents product breakdowns.

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Why the Time is Now to Introduce IoT-Enabled Products

CHAPTER ONE

Why the Time is Now to Introduce IoT-Enabled Products

IoT is advanced enough

The evolution of IoT technology has reached a stage where it's advanced enough to integrate with existing systems in diverse industrial settings. Breakthroughs like enhanced connectivity, sensor capabilities and advanced data analytics have made developing innovative IoT solutions that cater to customer needs more achievable.

With the introduction of Industry 4.0, automation and data exchange have posed a transformative shift in manufacturing. Much like how Industry 4.0 encompasses technologies like virtual reality and 3D printing, IoT is intertwined with real-time monitoring and control, smart manufacturing and predictive maintenance. These advancements facilitate intelligent data exchange.

Technology foundations are set

Dependable and accessible IoT solutions are ready for implementation. With the advent of Artificial Intelligence (AI) and machine learning algorithms, time-consuming tasks are automated and intelligent decisions are made without the need for human intervention.

The transition from 4G to 5G facilitates higher data transfer speeds, creating quicker communication between IoT devices and the cloud. 5G networks support a large number of connected devices per unit area, making them ideal for IoT deployments in industrial settings. 5G offers low-latency communication, which reduces the time it takes for data to travel between IoT devices and network servers.

This is crucial for applications that require immediate responsiveness, such as autonomous vehicles and industrial

automation. Real-time data processing ensures streamlined operations, while scalability empowers companies to deploy remote systems across large areas.

Products are more affordable

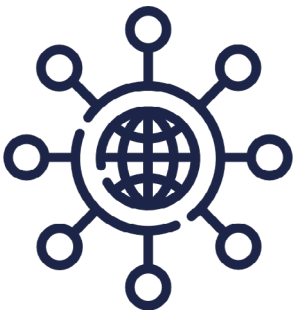
The advancements in technology mean that IoT products have become more affordable over time. Forward-thinking companies widely use components such as sensors, microcontrollers and communication modules. This leads to higher production volumes to allow manufacturers to offer competitive prices to consumers.

Standardisation efforts and the development of interoperable IoT platforms have also driven costs down and simplified the integration of IoT devices into existing systems. With more uptake and competition within the IoT market, there's increased pressure to offer lower prices for customers. As a result, prices are driven down and IoT products are more readily available.

Demand to streamline operations

There's a growing demand for smart, interconnected devices to increase productivity and efficiency across diverse sectors. IoT opens up doors to analyse large volumes of data across complex facilities in real-time. With IoT, systems can identify inconsistencies within technology to prevent product faults and downtime. Using smart systems to recognise faults before the end customer presents a transformative productivity solution to ensure operations run as smoothly as possible.

These streamlined workflows improve operations for manufacturing teams as well as service and maintenance workers. In the industrial door sector, insights on door status, faults and maintenance history equip service teams with all the information needed before on-site visits. This optimisation streamlines operations for all stages across the supply chain. Companies can position themselves as innovative leaders within the market being early adopters of IoT technology.



02

How Does IoT Technology Work?

CHAPTER TWO

How Does IoT Technology Work?

To enable IoT functionality, sensors and switches are built into the product motors of equipment that users want to measure. This gives insight into factors such as temperature, vibration and movement. From here, the data generated is decrypted and turned into a tangible piece of information. It's typically stored in a large digital database which is accessible by authorised users.

An example of how this functionality operates is through data exchange via a Modbus system and gateway. The gateway includes a SIM card for transmitting data from control systems to the cloud through various means such as 3G, 4G and 5G or wired Ethernet connections. Wireless options like WiFi and Bluetooth can also be utilised. Data is transmitted to online servers using machine learning and insights can be easily picked up. From here, data dashboards can be set up to retrieve and present all relevant information.

IoT can be deployed through LAN (Local Area Network) and WAN (Wide Area Network), depending on the use case and requirements of the IoT application. In LAN deployment, devices are connected to a local network within a confined area such as a house, office building or industrial facility. These devices communicate with local servers or gateways such as Ethernet or Wi-Fi. LAN deployments are used for applications that require low latency, high data transfer rates and local control.

WAN deployment is used for IoT devices that are connected to networks spanning large geographical distances, such as cellular networks. These devices communicate with remote servers or cloud platforms over the internet enabling data collection and control from anywhere in the world. These deployments are used for applications that require remote monitoring management such as agricultural monitoring. The choice between LAN and WAN deployment in IoT depends on factors such as the scale of the deployment, security considerations, cost and connectivity requirements.

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Data Collection: What Can Be Recorded?

CHAPTER THREE

Data Collection: What Can Be Recorded?

Through sensor functionality, smart products capture valuable data for companies to use. The data that can be recorded in the industrial door industry includes:

- Door status (online or offline)
- Live faults and fault history
- Length of time doors have been open
- Which doors may need maintenance
- Which faults are most common
- Outstanding maintenance tasks
- Service history for industrial doors
- Real-time data of days when doors are open most
- Door activity outside of business hours
- Safety and energy reports

This data is presented in a user-friendly interface including colour-coded graphs, folders and various categories to break down the information. Each set of data is customisable, so teams can set individual names for each door. These dashboards allow users to access all real-time door activity within a facility from one place.

Dashboard users can define the most useful data in each application and set up alerts if activity strays from normal conditions. Thresholds can easily be set to determine when notifications are sent, such as when a door experiences a specific fault or is open outside of business hours. This simplifies communication within workplaces and promotes health and safety.

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Addressing the Challenges in the Industrial Door Space

CHAPTER FOUR

Addressing the Challenges in the Industrial Door Space

Relieves pressure on manual labour

Many industrial companies struggle to find enough people to carry out routine checks on certain equipment. IoT-enabled sensors can be integrated into manufacturing equipment to monitor performance in real-time. This automation reduces the need for manual labour in overseeing machinery, which can be a complex, time-consuming process with potential for error.

Operation managers benefit significantly from IoT products, gaining a sense of control over activity across entire buildings. With an increased digitalisation of data, teams access straightforward, real-time insights spanning multiple areas. This includes live updates on door statuses, including which are open or closed, door locations and service history. Such data is essential in improving efficiency and promoting health and safety measures.

Enhances safety measures

Consistently monitoring operational safety can pose a challenge for many businesses. Workers can be at risk if a specific door is open at the wrong time or an abnormality in activity is missed.

Machinery with IoT sensors meets regulatory safety and security requirements, complying with all necessary safety standards set by governing bodies. Manufacturers conduct thorough testing and certification processes to ensure their products meet these requirements. IoT devices often incorporate built-in safety features such as fail-safe mechanisms to detect potential hazards and mitigate risks. These products generate sufficient data logs and reports so facility managers can access information about all activities to get to the heart of issues faster.

Alert systems can be set up in real-time to notify personnel of safety hazards or abnormal conditions. Users can choose how these alerts are sent and which team members receive them; they usually take the form of push notifications, emails or SMS. If IoT systems predict an abnormality within operations, companies can set up an emergency response integration in instances where evacuations need to take place. It's important to have this functionality in crucial parts of the building to maintain safety measures for all employees.

Using smart IoT products rather than manual labour is a more reliable alternative as systems can operate 24/7, increasing productivity and output.

Safety is also maintained through the monitoring of employee activity. Tracking metrics such as opening and closing of doors ensures employees abide by day-to-day regulations. The data collected through these processes can be used to help enhance education around safety measures in the future and flag areas for improvement.

Ensuring robust security

Doors open outside of business hours can pose physical security risks. Since IoT technology sends notifications to operations teams, users can be notified if doors are open when they shouldn't be. This helps to monitor live activity and protects against unauthorised access. Having real-time insights into this data helps teams spot areas for improvement, enabling them to tighten security measures.

Unexpected malfunctions

Unexpected faults in equipment cause issues in production workflows; a lack of real-time monitoring means these can often go unnoticed. Detailed access logs from smart IoT devices can spot signs of wear early and flag issues before they lead to bigger problems. Early detection functionality continuously monitors the health and performance of machinery in real-time. Data such as temperature, vibration, pressure and energy consumption can be measured by IoT-enabled systems and abnormalities that may indicate equipment failures are flagged.

IoT also promotes predictive maintenance. Companies can pay high costs calling out service and maintenance teams when faults occur suddenly. However, having advanced IoT technology spots the signs of malfunction early, flagging service and maintenance teams to come out before early issues turn into bigger problems. Levels of first-time fix rates (FTFR) are improved and unplanned downtime is minimised.

Maintenance of optimum conditions

In critical production environments such as laboratories and facilities, factors such as temperature, humidity and clean air are important to regulate. IoT systems remotely monitor conditions to ensure an optimum environment is maintained.

Insights into which doors are open and closed and at which times can help to maintain operations, save costs and energy.

IoT sensors also promote energy efficiency through predictive maintenance. When service and maintenance teams fix issues faster and improve FTFR, emissions are dramatically reduced.

Unexpected equipment breakdowns also lead to energy inefficiency, as suboptimal equipment performance consumes more energy than necessary for the same output. Therefore, preventing these unexpected breakdowns poses an array of benefits for the manufacturer.

Outdated data collection strategies

Managing data via traditional methods may lead to errors and inconsistencies in recording results. Without the digitalisation of data, companies may lack sufficient analytics to improve future operations. IoT products update data directly to cloud systems, giving users a full view of activity in a workplace. This can also help to pinpoint how product faults begin, as users can view activity history to find the cause of malfunction.

This digitalisation promotes a forward-thinking approach to data collection; operations teams can gain the right insights to make activity reports. All data is shown in a user-friendly interface and can be accessed by various teams across the company. These results can be analysed to discover trends such as regular faults.

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IoT in the Industrial Door Space

CHAPTER SIX

IoT in the Industrial Door Space

The impact on door installation

Installing IoT sensors is simple. Most device manufacturers, including GfA, use a plug-and-play approach, where software is easily installed and configured without a complex integration and setup. Installers don't need existing IT knowledge to implement the devices, meaning this is done independently of external technicians.

IoT sensors must be integrated with existing manufacturing systems such as supervisory control and data acquisition systems. Depending on the complexity of the deployment, this process may involve developing custom software interfaces to ensure sufficient data exchange and communication between systems.

Predictive maintenance

IoT products drive a new era for service productivity. Live product data reveals existing and future product issues, allowing companies to make timely repairs, sometimes even remotely. IoT devices flag faults before they happen, allowing maintenance teams to save countless hours determining issues before they even get to site.

More efficient servicing takes place, with service teams knowing exactly what equipment they'll need for the job, how long it will take and which people they should send to solve the fault. Having digitalised data provides service teams with valuable insights such as regular faults and which parts fail the most. Therefore, IoT technology is a game-changing solution to making service and maintenance activity run smoother.

Efficient service, quicker response time

Using IoT-enabled technology minimises the time it takes to repair products, as data is readily available for service teams to view. This reduces risks of product downtime as faults can be fixed before they develop, rather than waiting weeks before service teams visit the site. With this technology, teams provide a more efficient service to customers as they can usually complete all repairs in one trip due to pre-existing knowledge. This allows for better planning, empowering service teams to better manage their workloads.

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Addressing the Challenges of IoT

CHAPTER SEVEN

Addressing the Challenges of IoT

Security concerns

Smart products require robust security management to protect data. Transferring confidential data through IoT systems can raise concerns over data privacy risks and unauthorised access. Since IoT devices collect and transmit sensitive data such as personal information and usage patterns, ensuring data privacy is crucial to protect users against breaches.

Any device that's connected to the internet may be at risk of data tampering. However, companies leveraging IoT retain complete authority over their data and how it's shared. IoT data will only be shared with the company supplying the product as per the contractual relationship.

The implementation of the PSTI Act 2022 requires British companies to adhere to minimum security standards for all consumer IoT products. The Act applies to all consumer IoT products such as door locks and smart home devices and requires manufacturers to meet stringent security criteria. The aim is to prevent common security vulnerabilities such as default passwords and lack of software updates, which can make devices vulnerable to cyberattacks. Having this Act in place ensures IoT products maintain robust security measures to protect consumers against data breaches.

Collaborating with trusted suppliers like GfA assures companies that their data is stored within the EU, adhering to EU data protection regulations. The encrypted data flows through well-managed networks and is hosted in a data centre with no connections to any company outside of Europe. GfA regularly conducts penetration tests to assess platform security, promptly addressing bugs or vulnerabilities to maintain a secure data flow.

Cost implications

The cost of installing IoT-enabled products can vary significantly depending on factors including the type and number of devices being deployed as well as infrastructure upgrades. Despite concerns about upfront expenses with IoT implementation, the outcome is often cost reduction rather than escalation. When product faults can be pre-determined, companies can save costs through less product downtime and fewer service and maintenance callouts.

While there is an upfront implementation cost, the long-term benefits outweigh the initial expenditure. Some companies may worry they'll need more staff to support new technology. However, IoT processes are automated through sensor activity, meaning there's no need for specialised staff to monitor these new systems. All data is presented in easy-to-use dashboards, complete with customisable graphs, charts and all relevant datasets to enable users to keep track of activity.

Technology overload

There's a prevailing misconception that adopting new technology leads to more faults as there are more assets to manage. However, most IoT sensors don't currently have the functionality to control devices - their primary function is data collection. This ensures there's no interference with controlling the industrial doors, which upholds the safety of operations.

Before implementing new technology, companies should undergo a comprehensive assessment of their objectives to determine which products best align with their goals. Pilot projects offer valuable opportunities to evaluate the effectiveness of technology on operations before committing to full-scale implementation.

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The Future Roadmap for IoT Products

CHAPTER EIGHT

The Future Roadmap for IoT Products

New exciting technologies

IoT devices will continue to be developed to encourage widespread adoption across various companies. The rollout of 5G networks enhances the connectivity and capabilities of IoT devices to enable faster data transmission, lower latency and support for a larger number of devices. 5G unlocks possibilities for mission-critical applications in industries such as healthcare, manufacturing and transportation.

Machine learning will play a crucial role in enabling more intelligent IoT systems. AI algorithms will revolutionise the way door manufacturers operate by providing insights into trends, common faults and overall operational activity. This wealth of data proves valuable for large companies managing numerous doors.

Improved security and privacy

With the increasing complexity of IoT systems, there will be a growing focus on enhancing security and privacy measures to protect against cyber threats and privacy violations. Robust encryption techniques are consistently being developed along with secure firmware updates to ensure the confidentiality and integrity of IoT systems.

As the IoT landscape continues to expand, there will be greater emphasis on interoperability to enable integration and communication between different IoT devices and platforms. This allows for seamless data exchange and collaboration across various environments.

GfA's roadmap to innovation

GfA's IoT products currently operate in a read-only mode, meaning they solely gather data without controlling devices. However, GfA is actively pursuing the integration of remote control capabilities. This advancement will enable two-way communication, facilitating remote technical support to address customer issues without sending someone to site. This functionality promises significant time and cost savings, eliminating the need for physical intervention, particularly for servicing equipment in remote or hard-to-reach locations, such as airports.

Where remote controlling features are to be introduced, thorough testing will be done to ensure security and safety standards are met, mitigating any potential risks.

GfA is also exploring the development of digital door documentation to centralise all information on specific doors. These guides will include readily available information such as installation dates, maintenance history and warranty status for each door model, as well as insight into warranties. Providing instant access to critical data optimises efficiency across various facilities, reducing expenses associated with unplanned service callouts.

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The Road to IoT: Getting Started

CHAPTER NINE

The Road to IoT: Getting Started

Companies must establish clear objectives before IoT implementation. The main factors to consider are:

- Identifying teams that need to use the data
- Defining how teams will use the data
- Determining how users will share and access the data
- Developing a plan for the areas of sensor and device deployment
- Ensuring data collection provides the insights needed
- Mapping out which processes will change as a result of implementation
- Deciding how the data will be used to analyse and improve operations
- Planning how to prepare human resources for IoT rollout

Developing streamlined workflows is paramount to optimising processes. For instance, if technical issues or malfunctions arise, workflows need to be put in place to determine which team members will receive alerts and what actions are needed as a result of this.

The next phase would be to pilot the technology within the workplace. Testing the equipment is fundamental to determining the best processes when implementing a change to operations. It's important to collaborate with a supplier who can offer technical customer service support throughout the process to streamline installation. To provide a better service to customers, companies must adopt a can-do attitude and demonstrate commitment to integrating IoT products. The tools and technology are all there, ready to be used. IoT presents opportunities to refine existing models, boost efficiency, increase margins and productivity. Embracing this digital innovation transforms ways of working and revolutionises operational models.

09

The Competitive Advantage

CHAPTER TEN

The Competitive Advantage

Incorporating IoT technology enhances efficiency throughout the supply chain and streamlines after-sales service for customers. When door installers and fitters can access relevant metrics such as door installation history, fault occurrences, usage frequency and user patterns, customers will receive a more tailored service experience. Having this data readily available also helps to validate warranty claims and identify agreement violations.

The collection and analysis of IoT data pinpoint inefficiencies, reducing downtime and driving cost efficiencies while bolstering productivity. This opens opportunities for companies to develop innovative products and services that align with emerging market trends and customer demands. Smart, connected solutions empower businesses to respond quickly to changing dynamics and customer needs. Leveraging real-time data allows companies to adapt their strategies to secure a competitive edge in today's fast-paced market.

SUMMARY

GfA and IoT

GfA stands at the forefront of the industrial door sector. They're not just manufacturers, they're innovators dedicated to pushing the boundaries of what's possible.

GfA transforms how businesses manage and maintain their door systems. Integrating advanced IoT solutions ensures that GfA offers customers unmatched control, efficiency and insight. Their focus on IoT integration sets them apart, making them the preferred choice for businesses looking to future-proof operations and stay ahead of the curve.

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