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IoT in Industrial Automation: Application and Benefits

Mr. Bhupesh Narote[1], Mr. Ramesh Mhanta[2]

[1]*Lecturer, Mechanical Department, A.G. Patil Polytechnic Institute, Solapur, Maharashtra*
bnarote@gmail.com
[2]*Lecturer,Electrical Department, A.G. Patil Polytechnic Institute, Solapur, Maharashtra*
mhanta@gmail.com

Abstract- Gartner defines the marketplace for business Internet of Things. structures as a fixed of incorporated software program skills. These skills span efforts to enhance asset control selection making, in addition to operational visibility and manipulate for plants, depots, infrastructure and system inside asset-in depth industries. These efforts additionally arise inside associated working environments of these industries. The IIoT platform can be ate up as a generation suite or as an open and general-reason utility platform, or each in combination The platform is engineered to aid the necessities of safety, protection and assignment criticality related to commercial belongings and their running environments. Internet of Things has a first-rate position in making this possible. All industries are doing automation via IoT devices are making remarkable changes in daily processes.[1]

Key words- Internet of Things Industrial , Device integration, Process integration, Data integration, , Ecosystem services, Security, Connectivity, Identification, Analysis, Applications of IIoT, Benefits of IIoT, automation ,Industrial IoT platform

1. INTRODUCTION

Each smart entrepreneur has the vision of automating their industry's processes to fit the latest technological developments.In a 1999 Procter & Gamble presentation; Kevin Ashton coined the word "Internet of Things." Nearly every area, computer, sensor, software,

etc, is linked to each other. IoT is the ability to access these devices via a mobile phone or via a computer.From a distance, these devices are accessed. For example, the sensor of an air conditioner may collect data on outside temperatures and change its temperature accordingly to increase or decrease the temperature with respect to the outside environment. In addition, your refrigerators will change their temperature accordingly as well. This is how a network can communicate with devices. The entire process begins with the devices themselves, such as Smartphone, digital watches, electronic devices that interact securely with the web of the Internet of Things. The IoT platform gathers and integrates information from different sensors and networks and uses analytics to share the most useful information with applications to meet unique industry needs.[4][2]

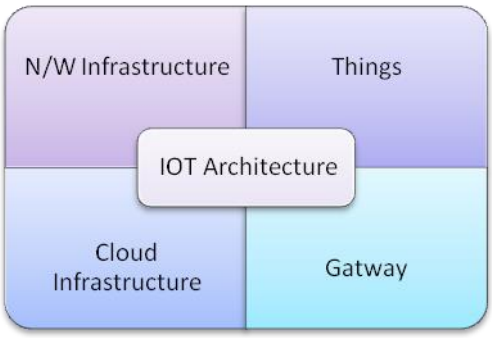

Fig.1 IOT Components

1.1) Network on Industrial IoT:

The concept of any industrial IoT platform requires an awareness that IoT provides a new level of integration as an enterprise has many more endpoints to handle than ever before with thousands of industrial IoT devices connected to the network. But, it's not just about computers, it's also a digital environment of people's systems and stuff that an industrial IoT network is. To manage each element within the ecosystem securely and efficiently, an industrial IoT platform is needed.[9]

In order to allow the seamless and safe flow of data between connected people , systems and items, the best industrial IoT platforms enable you to integrate devices with enterprise applications. Comprehensive facilities should be provided by an industrial IoT platform for following,

Device integration

The provisioning, management and withdrawal of all industrial IoT devices on your network would require this. Sensors, actuators, tags and beacons are examples of Industrial IoT products. The industrial IoT platform should be able to automate IoT data intake and make it accessible on the network to other components.[9]

Data integration

In its data lies the importance of industrial IoT. It is important to capture, incorporate and handle it. New IoT master data is connected by the industrial IoT network to existing application data and data from other sources , such as social media. [9]

Process integration

The industrial IoT elements do not work isolated from the organization as part of a digital ecosystem. It is important to build your industrial IoT solutions into your business processes and workflows. By incorporating industrial IoT business logic into other back-end systems and deploying industrial IoT data in workflow management, the industrial IoT platform coordinates this by workflow. [9]

Ecosystem services

It is the responsibility of the industrial IoT network to securely create, allow and manage trustworthy connexions across the digital ecosystem of individuals, systems , data and devices. [9]

1.2) Features of Network on Industrial IoT:

Security

Industrial IoT protection plays a key role in protecting all IoT endpoints from external cyber threats and addressing the potential for malicious activity within the enterprise.[3]

Connectivity

Throughout all stages of their life cycle, each industrial IoT device must be quickly and securely supplied and controlled, including monitoring and approving devices as they are supplied, recorded, enabled, suspended, unsuspended, removed and reset as required.[6]

Integration

One of the biggest industrial IoT problems is integration. The industrial IoT platform enables IoT devices to communicate and exchange information with various business applications , cloud providers, mobile apps and legacy systems easily and securely.[8]

Identification

Help for the widest range of industry-standard IoT devices should be provided by the industrial IoT network. To create a safe connexion, it should automatically sense their presence anywhere in the industrial IoT architecture. It can quickly create the credentials of the system or allocate them automatically where necessary. .[3]

Analysis

The amount of data inside the enterprise is significantly improved by IoT devices. One of the most important roles of the industrial IoT platform should be industrial IoT analytics. It allows industrial IoT data to be accurately visualised and analysed in a way that uncovers actionable knowledge to enhance data-driven decision-making. [3]

2. Industrial automation IoT applications:

IIoT # 1 Applications: Protection

Did you hear about sensors for fire? I hope you've heard of them for sure. It's a very small example of how IoT will provide the business premises with safety and protection. There are factories that have special protection requirements other than the general needs of certain industries. In order to save the workers from all types of incidents, IoT devices are able to constantly track safety indicators. They are also able to control and control the rates of illness and injury, indicators in industries can provide a safe and healthy atmosphere.[4]

Fig.2 Security System

IIoT # 2 applications: Automation of processes

With the assistance of IIOT, nearly all the processes can be atomized. Smart sensor networks that are linked to a cloud system will give your system a great deal of power. This would decrease the need for certain assignments to recruit workers. Today , with the help of AI technology, restaurants automate the method of detecting food waste. The reach of industry automation with the help of IoT devices is infinite.[4]

IIoT # 3 Applications: Repair

How can you keep up with the computers' maintenance needs? Depending on the signs of obstructed development. The IoT sensors are attached to the machines to decrease the risk of low-quality output. Before the real failure of computers, it gives signals. In order to help you to schedule the tasks, the maintenance alert will be issued. In industries of all kinds, this has made predictive maintenance possible. Do you wonder how it works? Every machine 's data is stored in the cloud system. Each machine 's history and schedule are available. In addition, it also allows the performance improvement and success of each machine to be calculated. .[4]

IIoT # 4 applications: Smart logistics

Transport drones significantly assist in logistics management. Even though you would think the investments are enormous. Yes, but they are still in the initial stages. It would turn out to be much less than investing in traditional approaches. The needs of components can also be tracked with IoT devices in addition to these. This is used mainly in the airline business. Without human involvement, inventory control can be efficiently managed by IoT devices. [4]

Fig.3 Smart Logistic

IIoT # 5 applications: Innovative packaging

Fig.4 Innovative Packaging

Smart monitoring systems have made it possible for manufacturers to track product losses. During the transit process, the weather, roads and other environmental variables are scrutinised. A pattern can be created by this monitoring via IoT mechanisms. After analysing the trends, companies can quickly determine the best ways to manage the commodity. You will be able to customise your packaging accordingly by using IoT creation services for this reason.[4]

IIoT # 6 applications: Smart vehicles

Automotive vehicles are used by businesses struggling to reach the next stage of industrial automation. Did you ever see it? It's just like children's motor vehicles! Smart cars have plenty of sensors inside them. In order to reach the destination, these IoT-enabled vehicles are able to divert their paths. These vehicles have a GPS-enabled location detection function that enables them to detect traffic and reach their destination smoothly in a short time. .[4]

3. Benefits of Industrial IoT platforms

The industrial IoT platform is the basis on which the efficient execution of IoT projects is based. Any large-scale industrial IoT implementation would struggle to achieve its full benefit without an efficient platform. A broad range of benefits are offered by the best industrial IoT platforms. :[4]

Cost reduction

It is expensive , time-consuming and complex to handle and maintain diverse industrial IoT devices and networks. The entire management process is centralised by an industrial IoT platform, eliminating much of the stress and expense. Moreover, as more businesses turn to industrial IoT providers to take care of their network management, the best industrial IoT platforms enable providers to offer pay-as-you-go pricing models. [4]

Enhancing operations

In order to help streamline and optimise business processes and workflows, industrial IoT solutions provide real-time information on the output of equipment and people. The industrial IoT platform enables operational changes in areas such as predictive maintenance and track and trace based supply chain visibility by collecting IoT data and allowing convergence with data from other internal external sources. [4]

Improvement in manufacturing

The framework provides the basis for the implementation of new industrial IoT applications, such as Digital Twins, which through new product design, creation and production will help drive innovation and performance. :[4]

Monetize IoT data

To create new products and services, creative businesses are already beginning to exploit the knowledge they obtain from their IoT data. After-sales and service are often more lucrative than the initial purchase over the lifecycle of a product. At each point of product development and use, the industrial IoT platform enables data to be collected and analysed. This allows both new data-driven service packages and entirely new data-driven products to be developed. [4]

Boost IoT protection

Notoriously, IoT devices lack enterprise-strength protection. Instead of providing layers of protection, devices such as industrial IoT sensors have little computing power beyond performing their basic reporting tasks. All identity management capabilities, such as secure authentication and authorization, can be supported by the industrial IoT platform to ensure that IoT endpoints are not vulnerable to cyber attack.[4]

4. IoT 's Effect on Automation

Compared to the previous initiation of new ventures, the IoT has reached the next stage of business, where the focus is mainly on integration and convergence across industrial verticals. Businesses are more focused on the importance and priorities of connected devices than on their versatility. The key factor taken into consideration is developments in connected IoT devices , networks, applications, systems, apps, and networking, among others. Owning or creating instruments and equipment with versatility in design, movement, reusability, and interconnectivity is essential for manufacturers. Increasingly, manufacturers rely on the integration of subsystems and modular modules that can help increase performance and ultimately reduce production costs. [10]

Manufacturing improved by IoT

IoT has become ubiquitous with apps in healthcare, home automation, and building and construction. Developing smooth communication to increase the capability and versatility of actuators, analyzers, and robotics is a major challenge for manufacturers. The integration of different commercial technologies through major industrial applications, such as programmable logic controllers (PLCs), can be offered by IoT-enabled industrial automation.

A primary digitization problem is the management of the vast amount of data. For OEMs to derive predictive models, analysis and dissemination of collected information and data is important. These models can enable end-users to reduce unplanned downtime that is often expensive. In addition to the use of the cloud, manufacturers need to programme an interface for the end user to read the data and display the most important information. In this way, without prior knowledge of big data, engineers may work with automation providers. [10][5]

How does the IIoT transform production?

Through adding more intelligent controls, sensors , and smart switches, the increasing cost-effectiveness of cloud technology, IoT, operations and maintenance staff are shifting to IIoT. Industries need systems that are able to conduct predictive analysis and assess the service period expected. Researchers found that such skills can substantially reduce organisations' total maintenance costs and can reduce breakdowns. .[3][10]

Organizations are keenly interested in combining the three basic business components: machinery, robotics, and human power. The advanced systems are implemented by conventional producers to minimise organisational efforts and development costs. .[3][10]

Supervisory control and data acquisition (SCADA) systems have been gradually embraced as a sign of growth for conventional manufacturers. It is difficult for conventional SCADA systems to deal with operations and logistics. This is where, by moving data obtained outside SCADA, industrial IoT becomes invaluable for companies. All aspects of manufacturing can be related by IIoT, including distribution, operations , sales, and inventory. .[3][10]

A massive IoT Product Market

Gartner expects that there will be 20.8 billion smart devices by 2020, and McKinsey forecasts that within the same time span, the overall IoT market value will rise to $3.7 trillion. There is a strong demand for platforms that act as the bridge between sensors and the network of data with so much information being recorded; some businesses are tapping into this significant source of potential revenue by operating as IoT service providers. According to industry estimates by Zinnov, this sector is highly fragmented, with the top 20 IoT service providers accounting for about 80 percent of the market. [11]

CONCLUSION:

The advantages and applications of IoT in industrial automation make a lot of things possible that were a few years ago impossible for humans. All businesses are drawn to the alluring advantages of IoT in industrial automation, from top-notch businesses to startups. The IoT is an enormous network of communicating hardware, software , and applications. In addition to technologies such as sensors and environmental metres, everyday items such as coffee pots and cars may be part of "things". Such items are fitted with sensors to collect data and the ability to exchange information on the internet. It is this potential that makes computers "intelligent." [10][9][6]

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