

An Outlook on Testing and Measurement Criteria for Industrial Internet of Things (IIoT)

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Abstract

IoT is highly essential to survive in the digital world. IoT is a broad term which includes the connected home, smart cities, the production industry and the digital electronics. However the advancement in the technologies is making industries more effective and the machines smarter. Due to the evolvement of IoT, there is a necessity for testing at various levels. IIoT testing depends on the device sensitivity, network reliability etc. In this paper we discuss an overview of testing and measurement parameters for Industrial Internet of things IIoT.

Keywords: Industrial Internet of Things (IIoT), Testing.

1. Introduction

The IIoT indicates usage of IoT in the field of industrial applications. It provides an opportunity for the industries to sustain better efficient and reliable operations with respect to machine-machine communication and big data analytics. The IIoT includes robotics, medical electronics and the production processes defined by software. The IIoT includes both networking devices and consumer devices associated with IoT. The difference is the combination of information and operational technologies and operational technology. Generally Operational Technology includes human machine interfaces, Data acquisition Systems, Distributed Systems and Programmable logic controllers.



Fig 1 . Industrial IOT

The combination of above technologies provides better integration with respect to automation and clear visibility of the supply chain. The physical infrastructures are monitored and controlled in an easier manner using smart sensors and actuator in the fields of agriculture, medical, production, transportation etc. The IIoT is integral to transformation of cyber-physical systems and production processes with the aid of big data in the view of fourth industrial revolution. The industrial devices and infrastructures are able to obtain real time information from the sensors and other sources for their decision-making with respect to specific actions. Moreover IIoT is crucial to typical examples such as cities becoming smart cities and industries becoming smart industries. The transition of real time data among the smart machines enables the industries and enterprises with lot of growth opportunities. This real time data can be used to correct the errors in the supply chain and address them thus improving the day-to-day efficiency in industries and enterprises. The large amounts of data at huge speeds can be analyzed in the businesses due to the smart devices connected to each other. This approach will improve the scalability and performance of the industrial units. Thus integration of IIoT can give a clear view of moving operations and business decisions for the industries.

2. Need for IIoT test and measurement

The testing must be dependent upon the user approach rather than on requirements. The quality is very much required to include a set of web applications, test environment, tools and simulators for testing. It is responsible for quality control in production and overall efficiency. The real time data on critical parameters are very essential for manufacturing companies. The sensors play a key role in collecting the real time data for industries.

The sensors provide more accurate data for industrial systems with respect to automation. It is true to say that IIoT is nothing without sensors to measure various parameters such as strain, temperature etc. Different industries use different sensors for different purposes for a longer period now. But due to IoT, the future sensors are designed with provisions to solve the challenges of future automation. These sensors are smarter and have good communicating capability with other sensors and computers in the remote place.

3. Role of sensors in IIoT

Smoke Sensors: These sensors are used in applications like HVAC, construction sites and industrial areas where a probability of fire and gas leakages is higher. If these sensors are associated with IIoT, the smallest leakage of gas or occurrence of fire can be detected and major disaster can be avoided.

Proximity Sensors: These sensors are associated with measurement of the distance between itself and the near objects. They are used on the bumpers of cars give an indication to drivers in view of a sudden collision. They are also used in the retail industry to guide the customers about the discounted products.

Infrared Sensors: These sensors are employed for Military applications widely for the past few years to detect the presence of human beings. Since these sensors detect infrared radiations, they can be used in electronics, chemical, medical industries etc.

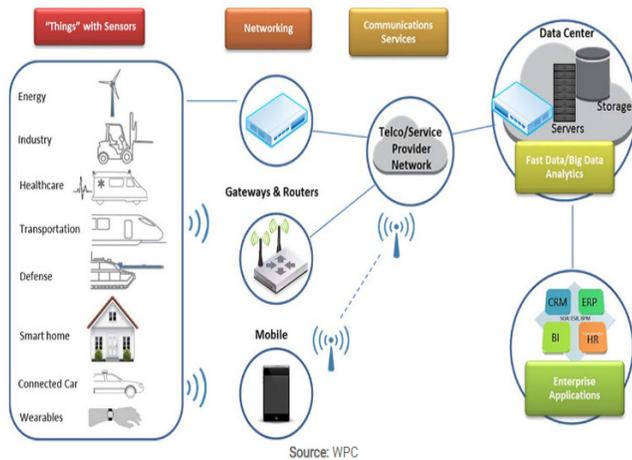


Fig 2. Role of Sensors in IIoT

Piezo Sensors: These sensors are connected with measurement of change of pressure with real time. They are used in boilers, furnaces, drilling systems etc. **Temperature Sensors:** They are employed in a number of industries like FMCG, pharmaceuticals, biotechnology etc where measurement of temperature-monitoring is highly important. Typical examples include - Melexis MLX90614, Environdata TA40 Series, Geokon 4700. **Optical Sensors:** These sensors are capable of detecting the light. They can detect any type of electromagnetic radiations for the industries like - Telecom, elevators, construction, healthcare etc. Typical Examples include - Vishay's VCNL4020X01 and TCxT1600X01.

4. Test approaches

Scalability, Performance and Security are the essential parameters to be verified with respect to testing of IoT applications. The following are few tests associated with IoT. **Edge testing:** This type of testing is highly essential important for any IoT application which provides real-time analysis at the edge of a network hindered by network bandwidth, capability, and reliability. **Device interoperability**

testing: The capability of interoperate protocols and devices with various specifications and standards will be accessed. **Security and privacy testing:** This testing provides protection of data and authentication of devices in cloud computing. **Network impact testing:** This testing verifies the performance of an IIoT application in network conditions with various network parameters and environment conditions. **Performance testing:** This testing includes large volume of data and accuracy is checked for performance with respect to real-time analysis.

5. Conclusion

This paper provides a survey of existing definitions of IIoT. It provides illustrations about IIoT in modern manufacturing field for the enhancement in production. This gives a detailed study in the various techniques and methodology followed in the modern smart industries. Machine tools in the field of manufacturing should be real-time monitored. By exploiting the merits of IIoT technology, various manufacturing resources are identified and their statuses could be then captured.

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