

INDUSTRIAL INTERNET OF THINGS AND INDUSTRY 4.0

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Industrial Internet of Things (IIoT) as the fundament of the Industry 4.0 based on Industrial Control Systems (ICS) and connected devices as part of it. IIoT make possible integrate all step during product lifecycle into online monitoring and online decision making processes. In this scenario the product lifecycle should be completely controlled by manufacturers and customers within online. The IIoT may include many of all-around-us applications – energy, transport, manufacturing, healthcare etc, and provide control functions over the product life cycle.

The IIoT reference model (RM) [1] make possible to describe processes with some domains and relationships between it. It contains five functional domains – control, operations, information, application and business. The control domains (CD) describe how the communication with physical devices, i.e. transport data to top levels and request to the physical systems, must be realized. CD reached by functions of the classical ICS. On this level functions of the data acquisition and the processes control in automatic or manual (by operator) modes are realized. Top-level-domains contain functions for accumulate and processing data, and the decision making based on the obtained data and the predefined business logic. Between business (top level) and control (bottom level) levels we can find functions for the data operate and communicate throw levels.

IIoT devices should to work in various conditions and this conditions may be very aggressive or variate in wide bounds. In addition to aggressive operating conditions IIoT devices should be reliably protected from external influences, for example, impacts on the operation of the final equipment through communication channels. The problem of building secure distributed sensor networks is one of the key issues for the implementation of the Industry 4.0 technologies. IIoT-devices contains some (more or less) computation capability to provide local autonomous intelligent operations.

The most important IIoT-system characteristics are safety, security, resilience, reliability, privacy, scalability. In this point of view, we can describe some architecture patterns for such systems and, maybe, for the Industry 4.0 the most general pattern is «three-tier architecture» that includes edge (physical systems), platform (software and hardware that operate with data) and enterprise (rules, controls, business logic) tiers.

Today IIoT as part of the Industry 4.0 is one of the rapidly growth fields of the Internet and industry, more and more system are based on IIoT: DHL tracking and monitoring; Caterpillar for fleet monitoring and to track fuel efficiency; Siemens plant in Amberg where machines is used to carry out 75% of the labor; Honeywell Connected Plant and it solutions in various fields and so on.

References:

1. The Industrial Internet of Things Volume G1: Reference Architecture. – IIC, 2017. – 58 p.