



RIOTANA® – THE AFFORDABLE SOLUTION FOR ENTERING THE WORLD OF INDUSTRY 4.0

Fraunhofer Institute for Software and Systems Engineering

Department »Digitization in Logistics«
Emil-Figge-Straße 91
D-44227 Dortmund

Any questions?
Contact us!

dil@isst.fraunhofer.de
Phone +49 231 97677 – 0

www.isst.fraunhofer.de
www.isst.fraunhofer.de/dil

REALTIME MONITORING OF PRODUCTION PROCESSES

In many enterprises, the notion of »Industry 4.0« still leaves a lot of room for speculation and irritation. The vision of products and machines communicating with each other in order to autonomously steer the processing and conveyance of parts first and foremost raises questions regarding the costs and benefits of implementing an Industry 4.0 solution. What many executives seem to misunderstand is that self-management and self-optimization of production processes represent the final stage of that vision; the state of the art is much less futuristic, referring mainly to IT-supported production (e.g., ERP systems, computer-controlled machines, robotic assembly) and logistics (e.g., route management systems, warehouse management featuring computer-aided order picking).

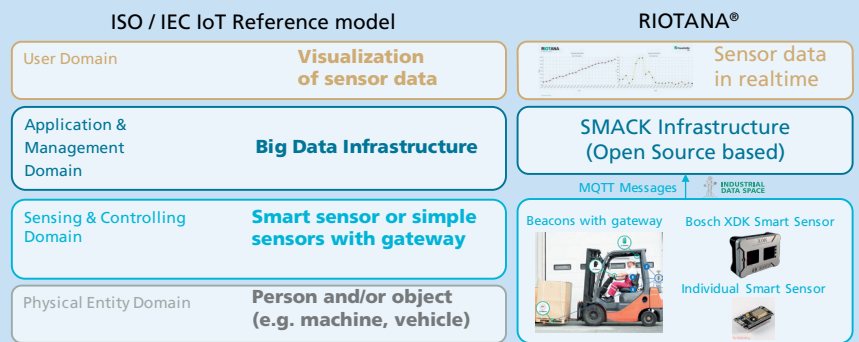
In view of the requirements posed by Industry 4.0, enterprises need to

- visualize events occurring in production processes ,
- detect interrelations between such events, and
- predict events.

Addressing these needs, **RIOTANA®** (Realtime Internet of Things Analytics) is Fraunhofer ISST's affordable, easy-to-use solution for enterprises to make their first steps in the world of Industry 4.0.

RIOTANA® allows you to,

- easily equip objects and humans with sensors,
- transfer the sensor data recorded to a big-data infrastructure in the cloud, and
- evaluate the data in the cloud in order to be able to process it in real time with the help of analytics and machine learning.



Using real-time data processing, it is possible to

- detect interrelations between events,
- detect soft spots in processes, and
- predict events.

The system architecture of **RIOTANA®** complies with the IoT reference model according to ISO/IEC. Data usage can be restricted as specified by the reference architecture of the **Industrial Data Space**.

VISUALIZING EVENTS AND CONDITIONS

As low-cost sensors can easily be integrated in existing processes and infrastructures, **RIOTANA®** allows low-effort monitoring of processes and detection of events or conditions occurring therein. The solution makes undesired events and conditions directly visible.

RIOTANA® Lambda architecture, which is based on **SMACK** open-source software components, is capable of efficiently processing high-frequency data streams. Incoming data is visualized in real time over a web-based application.

ANALYZING EVENTS AND CONDITIONS

RIOTANA® not just allows visualizing incoming data, but also analyzing it. To do so, the system uses a library of machine learning methods. The functionality comprises basic statistical operations (such as calculating mean/average values or determining variance or standard deviation) as well as methods for classification (e.g., naive Bayes), regression, or clustering.

RIOTANA COMPONENTS

The **RIOTANA®** system consists of a set of easy-to-install and easy-to-configure sensors. The sensors send their data to the

cloud using the MQTT ISO/IEC standard.

For data transfer, an existing WLAN infrastructure can be used, or a separate network can be established. (It is important to note that the data owner always stays in control over their data, as data usage can be restricted using the Industrial Data Space's metadata repository.)

In the cloud, a MQTT broker receives the data coming in and forwards it to the **SMACK** infrastructure for being saved there. From there, the data can be invoked and displayed in real time via a graphical user interface. The **SMACK** infrastructure can be enhanced by adding further, application specific functions for analysis. Analysis operations and results can also be displayed via the GUI.

YOUR BENEFITS AT A GLANCE

- Affordable Industry 4.0 solution
- Can easily be installed and configured
- No integration with existing IT required (except for integration with existing WLAN)
- Allows quick analysis of selected processes

OUR VALUE PROPOSITION

You want to digitize your business processes in order to make them more efficient, but you are not sure how to get started? Then **RIOTANA®** is the solution you have been looking for!

Fraunhofer ISST will support you on your journey to becoming a digital enterprise by providing you with state-of-the-art tools increasing process efficiency and reducing cost.

Don't hesitate to get in touch with us! We are looking forward to offering you consultation!

LAMBDA

Lambda is a data processing architecture designed to handle massive quantities of data. It comprises a batch layer for responding to queries and a speed layer for processing incoming data streams in real time. Data streams consist of multiple datasets, which are processed according to their timestamps.

SMACK

SMACK is an acronym formed from the initial letters of (Apache) Spark, Mesos, Akka, Cassandra, and Kafka. These are open-source software components used for real-time capable big-data solutions.

MQTT

MQTT (Message Queuing Telemetry Transport) is a lightweight messaging protocol (ISO/IEC PRF 20922) for exchanging messages between machines. Based on the publish-subscribe principle, a client sends a message to a message broker, which forwards the message to the intended subscriber. MQTT is widely used with IoT applications.