IO-Link and Sensor Fusion

GOAL

To answer the increasing demand of process data in semiconductor manufacturing, the use case focuses on simplifying sensor integration by providing an IO-Link platform. The second part aims at developing sensor fusion for the data transfer of new mobile automated robotic systems.

CHALLENGE

In modern semiconductor manufactories, a large scale of sensors provides the data necessary for monitoring the process flows. Thereby the integration of new sensors is very time consuming (up to three months) and needs the attention of up to six employees. In the future, the exact monitoring of the process parameters as well as the environmental conditions could increase in importance due to the new BigData analysis techniques and therefore the number of sensors need to be extended. The problem is targeted by developing a standardized hard- and software solution in form of an IO-Link platform, that simplifies the integration by automating many steps of the process. The new architecture is shown in the following figure and describes, how the Arrowhead Framework will enable the successful use case outcome.

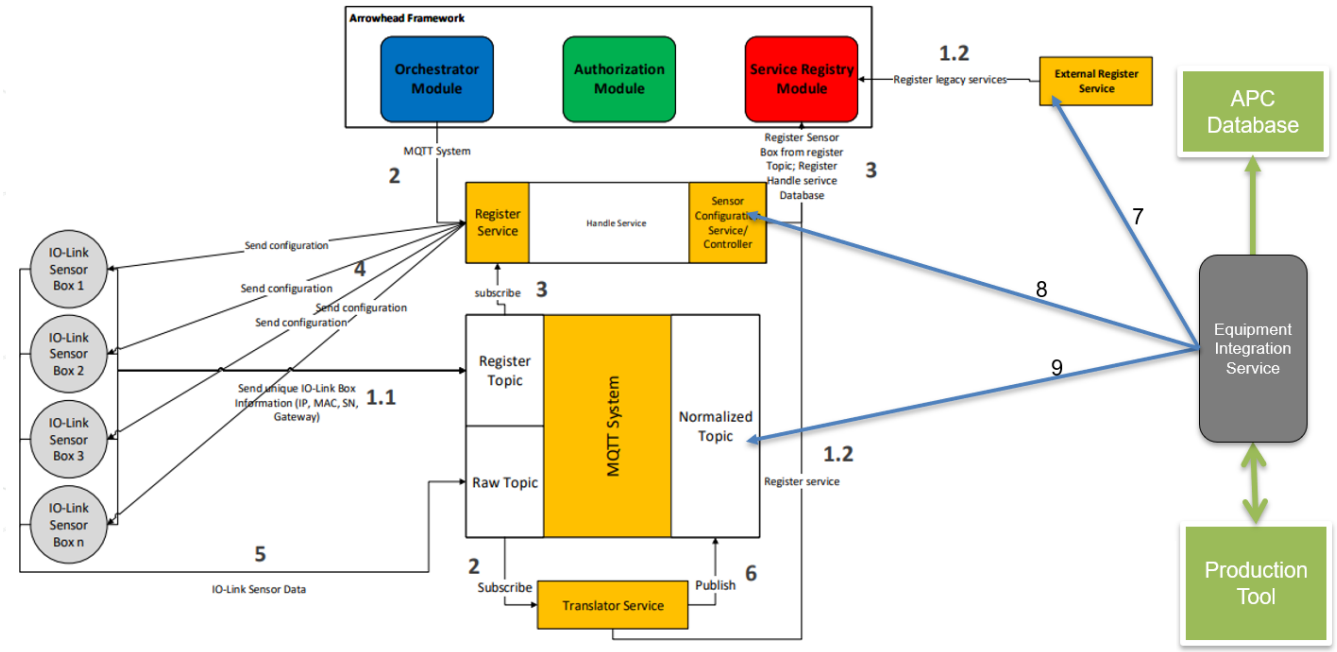


Figure 1 Sensor Integration Architecture

The IO-Link sensor device is provided to the HTW and the detailed architecture for plug and play sensor integration has been developed. The process flow of the concept can be seen below in figure 2. The MQTT broker is the central information distribution feature of the architecture which enables the communication between the sensors/devices and the databases in the first point.

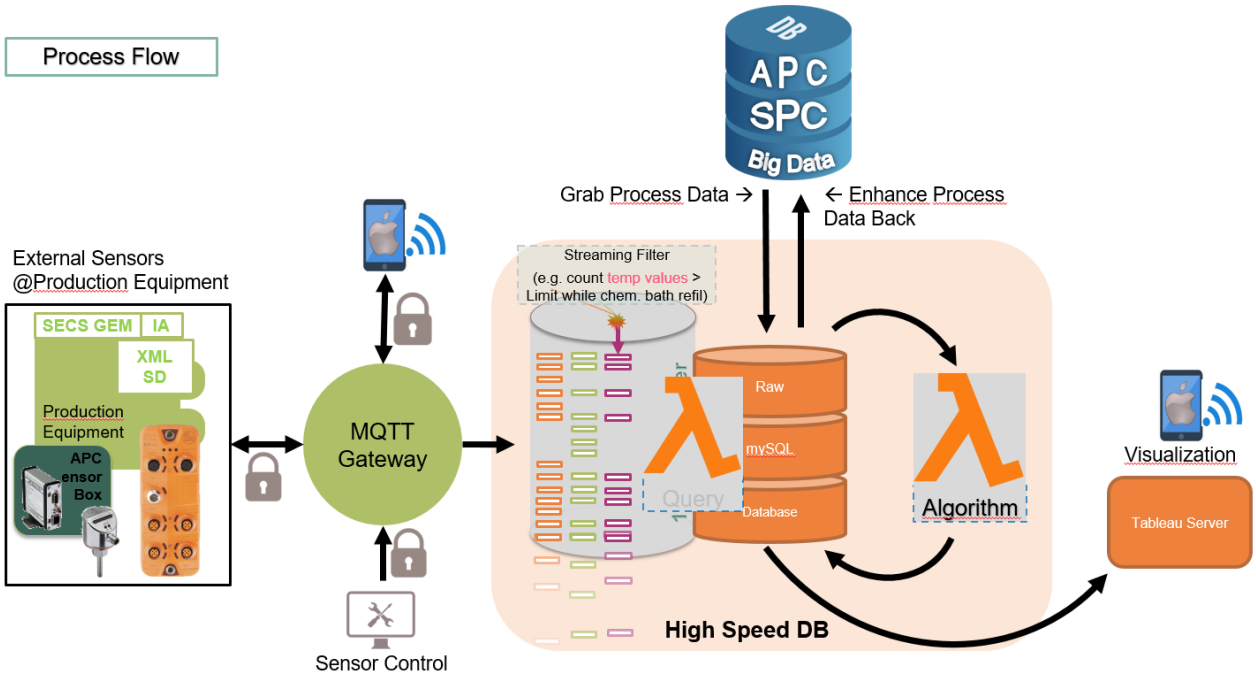


Figure 2 Process Flow of Sensor Integration

The creation of not yet existing Arrowhead services as well as the integration of Arrowhead-Tools in the Infineon Software Landscape were challenging obstacles within the use case contribution.

The topic sensor fusion is dedicated to solve the problem of creating new levels of senor surveillance of certain process flows which cannot be observed by a single form of sensor data. The fusion of different data enables to add a new information layer to the process monitoring which was used for classification tasks within the use case but aims at enabling mobile automated robot units. The architecture of the developed system is displayed in figure 3.

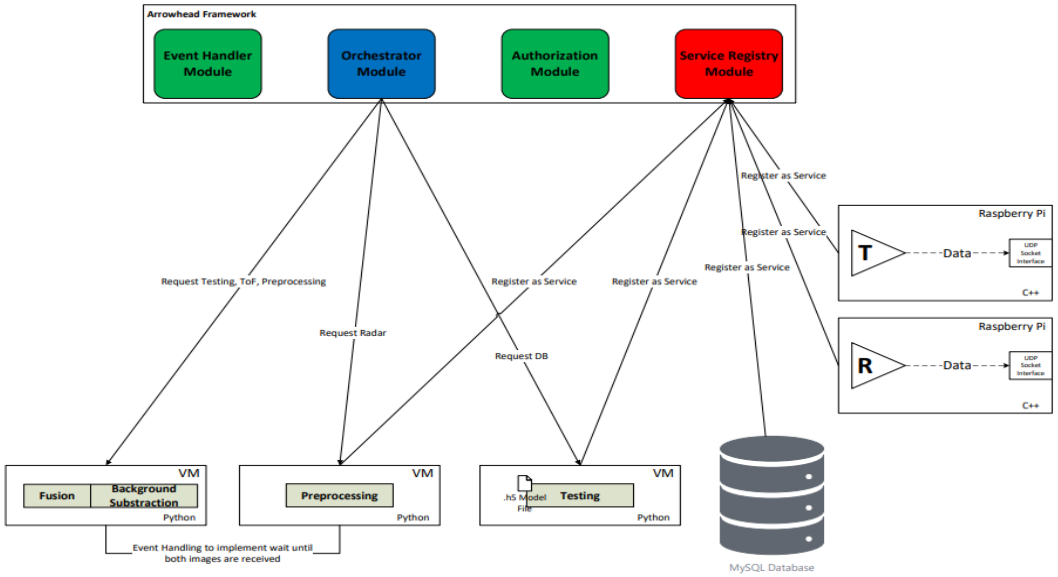
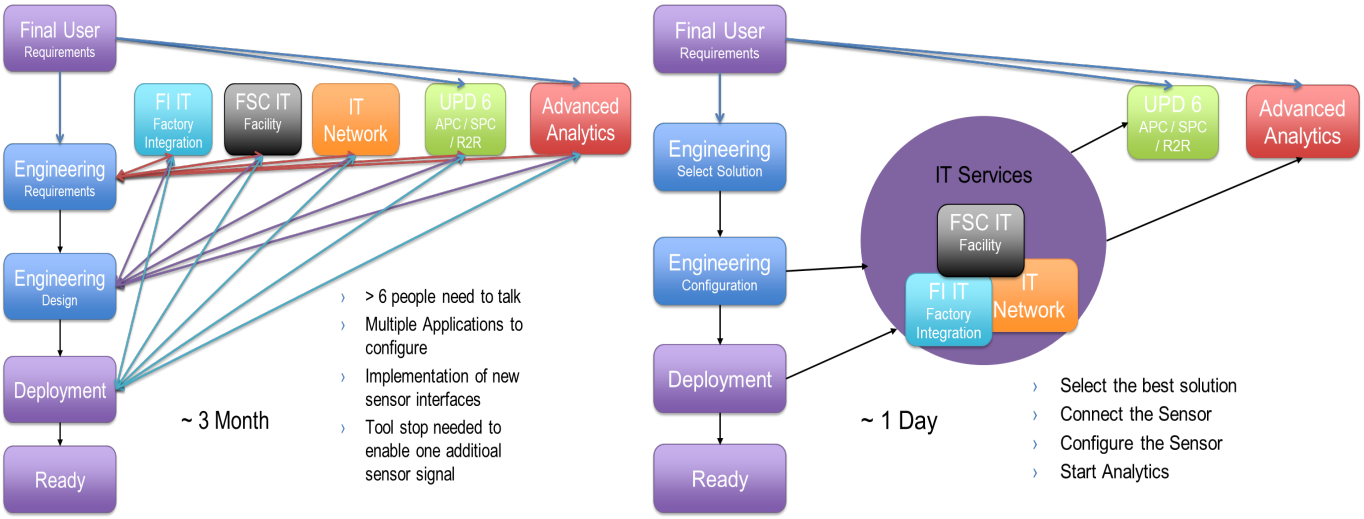


Figure 3 Architecture Sensor Fusion

This project has received funding from ECSEL Joint Undertaking (JU) under grant agreement No 826452. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Norway and Switzerland.

RESULTS

The Arrowhead Core Services are running for sensor integration on a virtual server and support all Infineon use cases. The handle and the translation services were created by HTW. The demonstrator works at the university and can be installed at Infineon.
The exploitable results of the use case include the reduction of process steps and thereby reducing the number of persons involved. The integration time can be decreased by close to 3 months.



The reduction of the time needed for sensor integration will lead to early benefits and fault prevention. The shortening of the engineering process saves time for both, the development engineers as well as the maintenance employees.
The idea is to make sensor integration as easy as to plug in a USB drive.

Sensor fusion provides a new fusing technique to supply data for complex use cases like classification task or automated mobile robotics. It was possible to use ToF and radar data to perform human classification task within the factory.

ARROWHEAD TOOLS

Requirements Functional Design

The Infineon Dresden production site was founded in 1994 and has now more than 2700 employees. It is one of Infineon's most modern and largest location for manufacturing, technology and product development.
In addition to its 200 mm production line, Infineon Dresden established the world's first high volume 300 mm wafer production in 2011. Nowadays, more than 400 different products are manufactured in the highly automated fab on the basis of 200mm and 300mm wafer for the four business fields of the

Contact: Germar.schneider@infineon.com · www.infineon.com

ARROWHEAD
TOOLS