SAFIRE

CLOUD-BASED SITUATIONAL ANALYSIS FOR FACTORIES PROVIDING REAL-TIME RECONFIGURATION SERVICES

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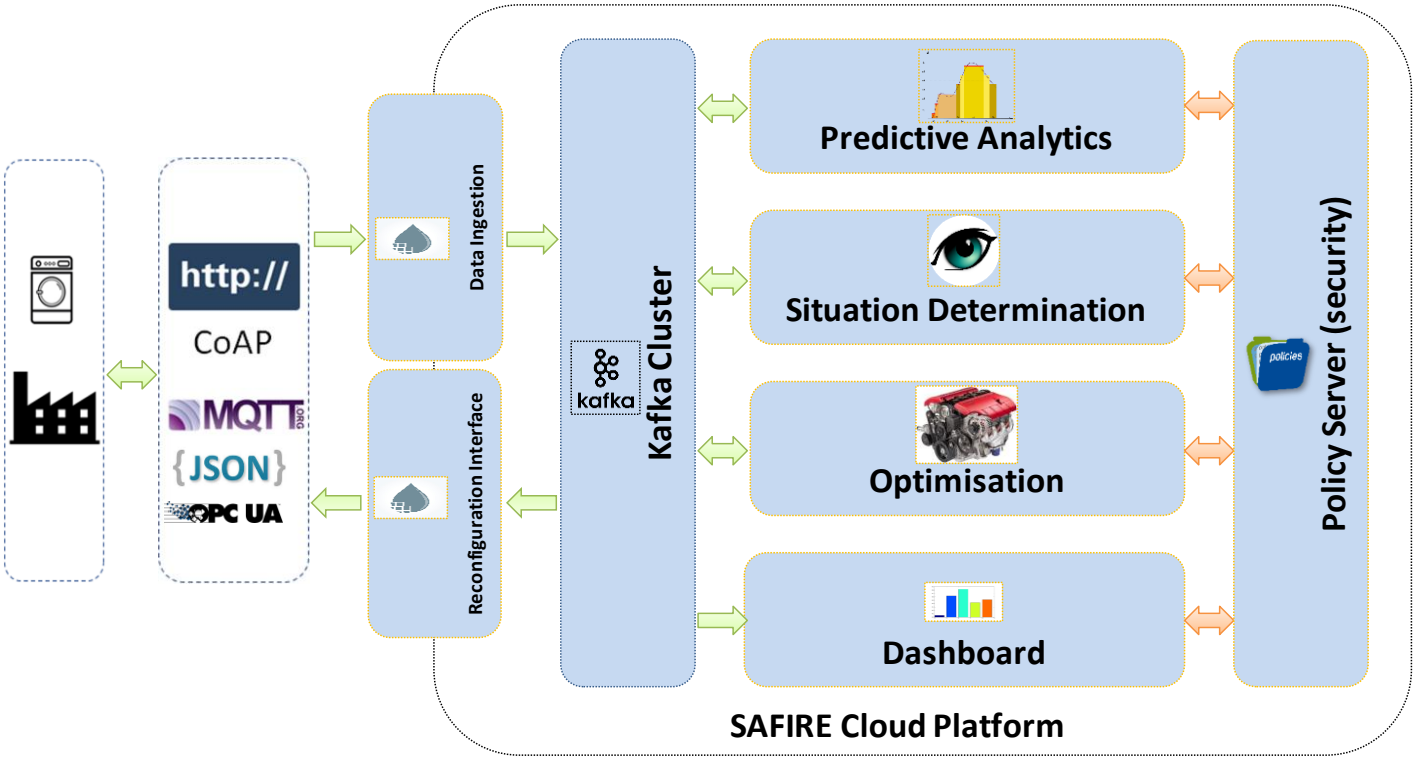
SAFIRE Technologies



The SAFIRE platform is a secure, privacy-aware cloud platform, that will allow manufacturers to obtain real- time reactive and predictive reconfigurations of their production systems.

The SAFIRE project with a very challenging objective in mind: to create a plug-and-play solution that would enable product manufacturers to automatically reconfigure their production processes, or the features of their products, in real-time, based on the data-streams gathered from the production processes and the use of the products.

SAFIRE offers an add-on platform to existing production management and control systems, and implements several services to achieve this behaviour.

The **Situational Awareness** services observe the production-management and control systems to identify the context of the production process and product use.

The **Predictive Analytics** service performs near real-time analytics on gathered data from smart products and production in the factories.

The results of these two services are used by the **Optimisation & Reconfiguration Engines** to propose the necessary reconfigurations of the process, or product, in (near) real-time.

Optimised and evaluated reconfigurations are sent to connected production assets, and products, using Situational Awareness services and Reconfiguration interfaces.

The SAFIRE consortium made the technologies available as Open-Source.

Open-Source directory

https://gitlab.atb-bremen.de/SAFIRE

Electrolux

Business Case

Every product tells a different story: there are as many ways of using a product as users exist. In the field of home appliances, this is mainly manifested in the selection of functions (washing cycle, cooking recipe, etc.), or process parameters (e.g. spin speed, temperature), and in the way users interact with the user-interface.

SAFIRE solution enables analysis of data of embedded controllers of products in a cloud platform to obtain a number of valuable information that will meaningfully improve the experience of the customers. In that way, the cloud services implemented in the platform, capture data from the appliances which can be exploited, not only to improve the design and manufacturing processes, but also to embed new features in the working product if they improve the experience of the user. But SAFIRE goes further by gathering data of the context and extracting behavioural patterns of the user that can lead to a more optimised operation of the appliances. An example is the identification of the ideal time frame to carry out a defrosting cycle, when the appliance is traditionally not used, but keeping the adequate temperature for food preservation.

Our Business Case focuses on demonstrating the validity of SAFIRE in the real-time "Personalisation" and the "Adaptive operation".

Electrolux assess SAFIRE in three different scenarios:

- Scenario 1. Improvement of devices' performance based on the feedback obtained from the user.
- Scenario 2: Improvement of devices' performance based on historical data containing information about usage of the appliance, incidents occurred, maintenance actions, etc.
- Scenario 3: Adaptive control of devices based on a specific situation pattern identified by SAFIRE system.

Business Case

OAS AG is an innovative middle-sized company with a rich experience in weighing technology and industrial plant construction all over Europe. The objective of OAS is to demonstrate the use of SAFIRE to optimise production processes and preventive maintenance activities, managed by the proNTo control system, using reconfiguration based on the analysis of data gathered from the equipment and other systems.

ProNTo is a high performance process visualisation system for SCADA and, at the same time, a control system for the process and production control level (MES). It is optimised for the control and administration of batch-oriented processes and it is particularly suitable for weighing solutions.

OAS validated the SAFIRE technologies in one of their customers installations. The plant was continuously observed by the SAFIRE platform to identify usage patterns. These patterns were used for achieving optimal re-configuration parameters for a production process, as well as the baseline for advanced preventive maintenance based on analytics.

In addition, OAS intends to use information gathered from its customers to monitor the performance of their control systems. This will be used as feedback to OAS design process to improve design of new control systems.

The SAFIRE technologies will extend the overall OAS portfolio and increases the innovativeness of OAS through the addition of solutions for challenges related to Industry 4.0 (i.e. vast amount of data to process, needs for additional sensors for data acquisition and product control, connectivity demands, etc.).

The SAFIRE technology with its big data analysis, situational awareness and optimisation features comes, therefore, at an excellent time for a market entry with a very high potential.

Business Case

ONA is a manufacturer of EDM (Electrical Discharge Machining) solutions, highly specialised in large, custom and automated EDM machines and installations. As part of the digital transformation of the company, ONA focuses on the research of advanced services for connected machines. A cloud platform (ONA Smart Connect) is being deployed with de dual aim of improving ONA customer´s processes and ONA products and services performance.

Advanced data analytics and dynamic situational models are the SAFIRE technologies explored in the context of adaptive machining and smart EDM.

Research activities in this field try to increase the machine capabilities to adapt to changes with respect to pre-planned operations. When manufacturing a component, the relevant manufacturing data are monitored and registered to identify anomalies, or to advance deviations from a target pattern. It is a matter of research to apply machine-learning-based technologies in SAFIRE to anticipate unexpected events, or to generate new process sensors that can add valuable information to the signature part concept and the machine condition fingerprint.

The last developments in ONA EDM solutions increase the manufacturing options for a job. Apart from having many machine sizes and configuration options, some specific machining modes in the ONA Smart CNC open a potential for process optimisation. That is the case of eco-modes for saving consumables and energy, or the management of urgent jobs, for instance. It is expected that Optimization and Re-Configuration modules in SAFIRE will help ONA customer´s to select the optimal EDM manufacturing way in their EDM workshops.

Finally, the SAFIRE add-on concept is also an opportunity to test the interoperability service of the ONA Smart Connect platform.

SAFIRE Dissemination

The SAFIRE concept and results have been presented in several Industry 4.0 events worldwide:

- 1st IEEE International Conference on Industrial Cyber-Physical Systems (ICPS-2018), 2018
- 19th IFIP Working Conference on Virtual Enterprises (Pro-VE), 2018
- Adaptive Many-Core Architectures and Systems (AMCAS), 2018
- Machine Tool Exhibition. IMTS. Chicago, USA., 2018
- World Manufacturing Forum, Italy, 2018
- International Workshop on Trustworthy and Real-Time Edge Computing for Cyber-Physical Systems , 2019
- EFFRA Workshop on project results contributing to data spaces for Smart Manufacturing, 2019
- 10th International Conference on Manufacturing Science and Technology (ICMST), 2019
- 16th International Conference on Economics of Grids, Clouds, Systems & Services, 2019
- 22nd International Conference on the Applications of Evolutionary Computation, 2019
- 6th International Conference on Computational Science and Technology (ICCST), 2019
- Digitalisierung in der Produktion - Einblicke in Forschung und Praxis, 2019
- IEEE International Conference on Industrial Technology – ICIT, 2019
- Genetic and Evolutionary Computation Conference (GECCO), 2019
- Machine Tool Congress, 22 CMH, San Sebastian, Spain, 2019
- Machine Tool Exhibition. EMO, Hannover, Germany, 2019
- Effra Factories of the Future Community Days 2019
- 40th Real-Time Systems Symposium (RTSS), 2019
- proNTo Workshop "Digital Production", 2019
- European Coatings Show, 2019
- Powtech, 2019

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Industrial partners:

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ONA

oas AKTIENGESELLSCHAFT

More information in www.safire-factories.eu

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