Smart Factory Project

Key Project Facts

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Project Information

Smart factory is one of the most important business areas in the Industrial IoT domain. This project is concentrated on developing the key success functions to enable smart factory with EdgeX common features and other business specific features. EdgeX core layer functions are used to keep the interoperability with the other EdgeX microservices and the business specific features are descrived in successive sections and the Original Proposal s hows the functions in detail. The proposed features have been delivered in the form of microservice or relavant library software. Any business specific features can be the EdgeX common feature under the EdgeX community agreement.

Key Features of Smart Factory Project (business specific features)

Protocols, data models for command of metadata, and data representation from the sensors, machines and industrial robots to the edge devices.

OPC-UA is one of the famous industrial protocols used widely more and more. It is worth while implementing OPC-UA microservice that could operate with EdgeX core components. The OPC-UA microservice could be located in device service layer to communicate between industrial things (such as sensors, machines and robots) and Edge devices. And the OPC-UA microservice could be located in export layer to communicate with cloud service. So the S/W is devided into protocol S/W and each microservices. Command Data Model is for command of metadata. It will get you a easy expression of your request or response data which has a lot of categories and attributes. And Also, It's good at expressing a complex data which has depths. because Attribute Category can contain another Attribute. Data Representation is for offering the schema the collected data in manufacturing domains in a standardized way. Currently Smart Factory Project has provided AutomationML, which is one of the global standard data representation in manufacturing industries. More detailed information is described in technical note section.

"ezMQ" - Real-time messaging framework among the microservices

In the many industrial business scenarios, real-time data transmission is considered as key important function. Many industrial equipment and robots generate lots of data and they should be processed in very short time duration. Thus the fast data transmission scheme is strongly required among the various services of the edge device inside. The messaging scheme based on ZeroMQ is being developed for Smart Factory project. More detailed information is described in technical note section.

"Pharos" - Microservice and edge device management

A lot of edge devices might be placed for the smart factory to process data. And the edge devices can be grouped to support dedicated functions, or can be located hierarchicaly to process data step by step. So the efficient way is need to manage lots of edge device and microservice in the factory. To realize this, two components are being developed for microservice deployment and management in this project. One is service deployment manager and the other one is service deployment agent. The service deployment manager is the administration feature to deploy, update and monitor the microservices in the edge devices in the factory. And the service deployment agent is the control feature to install, run and remove microservices in each eage device. The one manager can administrate the multiple agents in the reachable network. The code are being developed for Smart Factory project. More detailed information is described in technical note section and edge device management is also going to be released soon.

Data processing runtime and workflow to analyze data

The most important reason why the edge computing is required in industrial IoT, is the data locality and low-latency response. Not only the fast data transmission but also the fast data processing function is also very important to realize smart facory. Therefore, the data processing near the data source using edge device can be resolve this problem rather than remote cloud data processing. Moreover the result of data processing near the data source can be used the feedback of the factory operational process and the feedback should be applied in a certain critical time. So the edge data processing is essential for the industrial IoT business. The edge data processing runtime code are being developed at https://github.com/mgjeong/support-dataprocessing-runtime. More detailed information is described in technical note section. To provide easier way to generate data processing procedure, the data workflow authoring tool will be introduced soon.

Technical notes

- Protocols, data models for command of metadata, and data representation
- ezMQ - Data transmission based on message queue among the microservices
- Pharos - Service deployment manager/agent and device management
- Data processing runtime and workflow

Smart Factory Code Repositories

All source code repositories of Smart Factory Project are listed here.

Community Committers

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