R in Automation:
Accessing Real-time-data in PLCs

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Industrial Automation in general and in particular PLCs (Programmable Logic Controllers) and embedded devices are a rapidly growing market. Embedded devices are found in small devices, like, e.g., watches or mobile phones, are used in everyday life as for example ABS systems or engine-monitoring systems in cars. In larger applications these system are typically called PLCs and used to control assembly lines, rolling mills or power plants.

Depending on the requirements on availability of automation systems on the one hand or safety considerations on the other hadn, more and more effort is put into monitoring the system during its whole life time.

Typical aproaches for monitoring are either rule-based systems or open-loop control scnearios. In rule-based systems data is collected and processed according to statically defined rules (e.g., issuing an emergency shutdown if some safety-related devices fails). Open-loop are designed to collect data and present the results to an operator. The operator then has to decide on further actions (or if the operator fails to acknowledge an alarm message, an automatic procedure brings the whole automation system into a fail-stop or fail-safe operation mode).

In addition to these methods, we are suggesting an alternative method to capture the "big picture" of the automation device and allow to apply statistical methods on the process data. This analyses will be the input for further optimization of operation of the automation system in better planning of device/system maintenence (so-called "predictive maintenance").

Fortunately, the automation industry has decided on standard means for data acquisition which is typically used by visualization and data collection software. OPC (formerly known as *OLE for Process Control*, nowadays OPC is marketed as *Openess, Productiviy and Collaboaration*) provides standardized mechanisms for accessing real-time data. This data can either be a PLC's or embedded device's internal state or "real" process data from the sensor/actor level (e.g., state of switches, valves or drives).

In our short presentation we will show how R can access this data using OPC DA (OPC Data Acquisition), which allows to connect to nearly every PLC or embedded device used in automation industry. OPC DA is based on Microsoft's COM technology, which currently is easiest to use with R for Windows. In addition to OPC DA we will shortly discuss current developments in the field of OPC which will also enable to access OPC data from non-Windows systems.

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