instinctools

Web Solution For Remote Real-time Management of Green Public Transport Substations

How replacing manual monitoring with an **automated control system** for the trams' and trolleybuses' traction substations allowed green public transport management municipalities in the Netherlands to **remotely** monitor, manage, and retrieve information on emergencies at the substations **in real time**.

Green public transport powered by electricity is now widely used in modern cities. There are different means of transportation that use various electricity storage and delivery methods. But the most famous among them are **trams** and **trolleybuses**.

A complex overhead wiring network infrastructure is used to deliver electric power to consumers. This includes kilometers of wires stretched along routes, carrying current and powering transport.

The so-called traction substations are used for delivery of electric current to the various points of a contact network. Traction substations are complex structures consisting of a set of high-power electrical installations, carrying out transformation and switching roles.

These facilities require constant monitoring and management. Usually, there are at least **10-15 substations within a city**. Manually monitoring all the substations and ensuring the continuous operation is obviously very difficult. In this case, the use of automated control and management systems would certainly help consolidate and improve the time of response to various kinds of failures and emergencies, thereby directly increasing the uptime.

Challenge

We needed to develop an **automated control system**, consisting of a hardware-software complex.

It was necessary that the control system would allow to remotely monitor, manage and retrieve information on emergencies at the substation.

In some cases, the system would automatically carry out control actions aimed at restoring efficient management.

Solutions

This task was quite specific. We, therefore, built an architecture based on the tasks assigned to us. We selected solutions for this architecture, which meet the customer's requirements and comply with the operating conditions. We also focused on price while selecting solutions. We were looking for the most favorable combination of price and technology needed to solve the task.

- From a list of criteria, we selected a specialized x86-based industrial computer running **Windows Embedded Standard**. Such computers were installed at each substation
- We selected a set of specialized digital and analog **I/O modules** from **Advantech**, a 3G modem for the provision of a communication channel with the central control room, interface converters for communication with intelligent modules at the substation
- We developed an **automated monitoring** and **control software** featuring an external communication interface
- We developed a **centralized control** and **management software** that allows you to obtain telemetry and remote signaling data from all substations and perform remote control actions

Key Features

- Constant monitoring and control of substations
- Remote retrieval of information on emergencies at substations
- Ensuring continuous operation of substations
- Restoration of efficient automated management

Technologies

- SCADA
- Modbus RTU
- 1-wire
- SPI
- GPRS
- SNMP
- RTOS
- ZeroMQ
- Node.js
- Advantech 4000
- Advantech 5000
- Embedded PCs

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