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SYSTEM OF AUTOMATIC CONFIGURATION OF TELEMECHANIC DEVICES

The automatic configuration system or the configurator of telemechanic means is a programme (or an application) that functions as an user interface and allows you to create and set up a telemechanics system quickly, conveniently, without highly qualified personnel assistance. Configurator is the implementation of the principle of using templates: if there is a class of typical tasks, they can be solved automatically, with minimal involvement of human resources. But the configurator should not be just a set of ready-made templates.

In particular, there is a whole class of setup tasks, which even a high-level specialist would like to solve in a template mode. This is the initial setup task that occurs when you install the system.

Firstly, during installation, you need to configure all system parameters at once, or at least set them to some default state. The number of such settings is calculated by thousands, and there is always the probability that a person will make a mistake. The use of templates during setup reduces the likelihood of an error, and if even it occurs, then it will have minimal impact, and it can be fixed later.

Secondly, the complete manual prescription of all the modern system parameters, even with the use of appropriate guieds, takes too much time.

Thirdly, the majority (practice shows that about 80%) of default settings, if they are placed automatically or on the basis of a short dialog, are not to be changed. This is the setting of the language, hardware, network, etc.

The main advantage of the configurator is the fulfillment of the user's tasks. The wider the range of these tasks, the more interesting the configurator is.

Since the configurator sets up to the telemechanics system itself, it has a wide range of applications: energy facilities, mines, tramway and trolleybus establishments, city outdoor lighting, railways, undergrounds, large industrial facilities, oilfields, airports, water channels.

The structure of the modern telemechanics system or the one-level information and control telemechanical complex (ICTC) contains the following main components (Figure 1): CTS – central transmitting station (control point device); RTU – remote terminal unit (controlled point device); CSh – controlling shield (or interactive video wall); CC – controller console; SRMCS – sensors of reported, metrological, code signals; EM – executive mechanisms; PC – personal computer; devices can be connected by RCL – radial communication lines; TCL – trunk communication lines; ChCL – chain (or transit) communication lines.

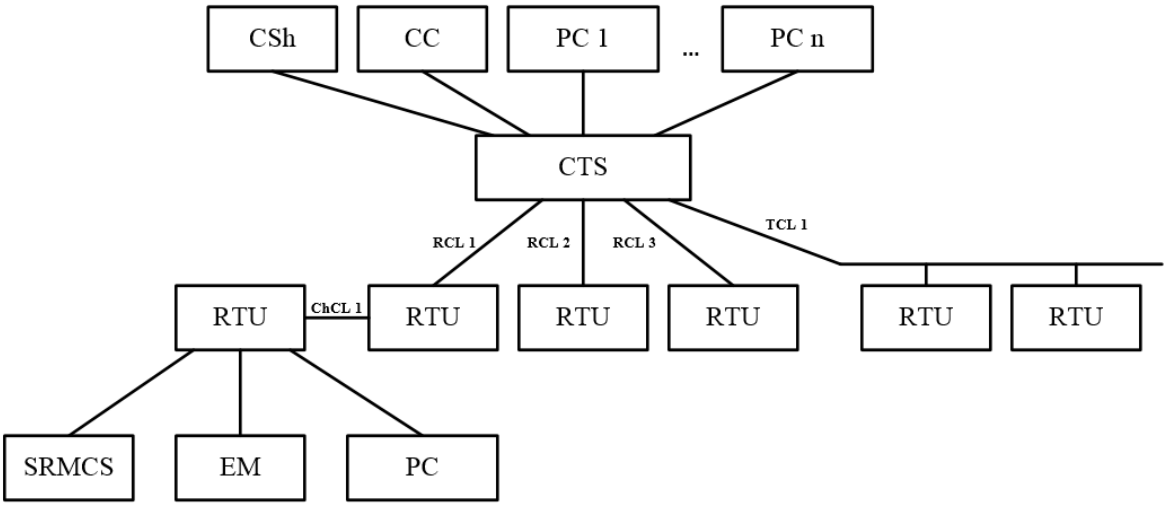

Figure 1 – The structure of one level ICTC

The structure of the multilevel ICTC is characterized by the fact that it consists of two or more CTS. A direct information link has been organized between RTU at different levels. ICTC acquires the rank of the network system. Control point devices RTU can be constructed according to different principles: main-modular, distributed, mixed.

It is proposed to develop a configurator that meets all of the above requirements and works with telemechanical devices in accordance with the protocols IEC 870-5-101, IEC 870-5-104, Modbus RTU, Modbus TCP, Granite, Granite Micro. The device has an ergonomic look and localization in three languages – Ukrainian, English and Russian.

The user familiarizes with the configurator starting with the representation of the main components of the system in a tree-like form. By selecting one of the tree nodes, you can get all information about this object. If the information about the object is too much, then the possibility of opening an additional window with its extended description is provided. For example, for RTU it is implemented in the form of a window where the graphic form clearly depicts the selected RTU, its modules and channels, which it combines with the upper and lower RTU according to the hierarchy. In parallel with this, a more detailed tree structure is displayed and when the node is selected, its full description is also given. Each object in the system has an individual identification number (ID), which allows to work effectively with objects that are not structurally linked. The visibility of the user interface provides an easy way to understand the structure of the telemechanical system and quickly configure the necessary tools, add sensors, expand or vice versa – to remove some devices.

The project is saved in xml format. It provides the ability to easily complete or modify the model without significant costs, which allows the specialist to configure the telemechanical system remotely or analyze it without the use of any specific software. The configurator is designed with the use of C #, because it fully utilizes the new .NET features, supports many modern information display technologies, interactions with different databases, etc.

Possible dependencies between objects of the user and system models are considered as well. When a change in a small part of the upper level leads to a change in

the part of the lower level dependent on it, this change will also affect the other parts of the upper level.

A very urgent question is the dependence of the program modules. Therefore, the configurator must be able to fix the situation of modules conflict, otherwise the development of each new addition will be an issue more and more laborious and unreliable.

The "correct" configurator should provide convenient tools for simulating user and system areas, for writing the logic of converting from the top to bottom and the reverse to create the interface, as well as the tools for interaction between the modules and their control.

REFERENCES

1. Локтікова Т.М., Кульчицький О.Р., Большой В.А. Дослідження сучасного стану та тенденцій розвитку інформаційно-управляючих телемеханічних комплексів: Тези доповідей IX Міжнародної науково-технічної конференції «Інформаційно-комп'ютерні технології 2018» (м. Житомир, 20–21 квітня 2018 року). – Житомир, 2018. – С. 176–177.

2. Кульчицький О.Р., Локтікова Т.М., Іщенко О.С. Система автоматичного конфігурування телемеханічних засобів: Тези Всеукраїнської науково-практичної on-line конференції аспірантів, молодих учених та студентів, присвяченої Дню науки (м. Житомир, 16–18 травня 2018 року). – Житомир, 2018. – С. 83–84.

3. Мартин, Р. Чистый код: создание, анализ и рефакторинг [Текст]: Библиотека программиста / Р. Мартин. – М.: Питер, 2018. – 446 с.

4. Локтікова, Т.М. Методи та засоби обробки і передачі інформації в системах і мережах передачі даних [Текст]: навчальний посібник / Т.М. Локтікова, А.В. Морозов, В.А. Большой, Н.О. Кушнір. – Житомир: Житомирський державний технологічний університет, 2015. – 162 с.

5. Рихтер, Дж. CLR via C#. Программирование на платформе Microsoft. NET Framework 4.5 на языке C# [Текст]: учебное пособие / Дж. Рихтер. – М.: Питер, 2013. – 896 с.

6. Сороко, В. И. Автоматика, телемеханика, связь и вычислительная техника на железных дорогах России [Текст]: Энциклопедия. Т. 1. / В. И. Сороко, В. М. Каинов, Г. Д. Казиев – М.: НПФ «ПЛАНЕТА», 2006. – 736 с.

7. Портнов Е.М., Ищенко А.С. Системотехника современных информационно-управляющих комплексов // Вісник інженерної академії України. – 2006. – №1. – С. 39–46.

8. Мартин, Д. XML для профессионалов [Текст]: учебное пособие / Д. Мартин, М. Бирбек, М. Кэй и др. – М.: Лори, 2001. – 866 с.