THE SCIENTIFIC PROBLEM OF BUILDING SOFTWARE SYSTEMS FOR LOGICAL CONTROL OF TECHNOLOGICAL EQUIPMENT

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Annotation
The article presents an urgent scientific problem important for the national economy, the analysis of its systems, which consists in creating theoretical foundations for the construction of modern logical control systems with a wide range of purposes, with an open modular architecture, flexible and configurable software.

Keywords: PAC, Safety, Motion Contro, systematization, big data, software and mathematical support, standard hardware input/output modules, logical control systems.

The rapid development of computer technology has led to an increase in the efficiency of logical control systems and to a significant complication of software and hardware. In this regard, system developers face the following issues: the use of existing computing platforms of personal and single-board computers; reliability, structuring of software and mathematical support; the use of external commercial solutions in the system; reuse of logical control programs; structuring and analysis of large amounts of data (big data) obtained from control systems about the progress of the technological process. The real situation in the field of logical control systems today is as follows: there is no complete understanding of the principles of organizing systems based on different computing platforms of computers (for example, single-board computers); about the architecture of software and hardware systems, which is based on advances in computing technology, and not on the experience of using equipment of specific developers [1]. The existing architectural models do not represent system solutions for the use of external commercial software modules and mechanisms for reusing the code of logical control programs.

The modular principle of the organization of existing systems is not systematized, which does not allow implementing new systems based on the layout and configuration of existing modular solutions. Distributed control in relation to logical control systems is often understood as the distributed functioning of hardware I/O modules, but not software and hardware computing facilities. Modern management systems are developed based on highly specialized requests of end users, which leads to the complication of systems, which means an increase in time costs, increased requirements for the qualification of developers and redundancy of the final functionality of the management system.

These problems do not allow end users to adapt control systems to their needs. If it is necessary to solve a specific problem, they are forced to involve specialists from the manufacturer or system integrators. The solution to the problem is possible by creating a methodology for building control systems, in which each of the steps is uniquely determined by a formalized model and supported by development tools. This will allow you to get an open solution that involves the implementation of a system modification for a specific task without additional redundancy. The traditions that have been established for decades have formed the principles of building a certain type of systems (PLC, PAC, Safety, Motion Control). However, at the moment there is no unified approach to the design and implementation of this type of systems in complex non-trivial projects, which does not allow creating a well-structured system and requires a revision of the methodological foundations of the design of logical control systems as a whole [2]. The issue of systematization of methods for designing logical control programs that solve a wide range of problems on the basis of well-known mathematical devices is acute. The systematization of methods also involves combining solutions to similar problems into single parameterized libraries of logical control programs, which can later be used to implement logical control systems in a certain area. The development of systems in the field of hardware consists in using a database of computing platforms of various types of computers and standard hardware input/output modules supporting one of the high-speed communication protocols. The development in the field of software and mathematical support consists in the implementation of a client-server approach, where the logical control core acts as a server, as well as the modular organization of the control system [3]. The analysis of control systems has shown that there is an urgent scientific problem of importance for the national economy, which consists in creating the theoretical foundations for the construction of modern logic control systems for a wide purpose, having an open modular architecture, flexible and configurable software and hardware, as well as the creation of methodological support for the development of this type of systems aimed at systematization of approaches to their design.

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