HYBRID POWER GENERATION COMPLEX WITH RENEWABLE ENERGY SOURCE AND SIGNAL CONVERSION ELEMENTS

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Abstract: Stationary and mobile hybrid energy production complex with renewable energy source, signal transformation elements, control systems and devices, simulation and physical structures of the working condition of energy supply systems and the device created in the monitoring of the energy supply system and the software complex serve in a mutually connected manner. shows. Network infrastructure, which in turn consists of interconnected small subsystems.

Key words: Automation, production, technological processes, Energy control and calculation automation systems, technological waste.

Hybrid power generation with renewable energy sources is complex and includes signal conversion elements, control systems and devices, simulation and physics of working conditions, equipment, server equipment, workstations, etc. At the same time, the essence of the concept of "system integration", in principle, is the term itself - the integration of systems, that is, the integral connection of individual components with each other [66].

Linking these components together to provide features that appear in a single system is an additional advantage gained from the shared use of subsystems that do not exist in each of the systems separately. The simplest example of creation is the control processes resulting from the comparison of

energy supply devices due to the exchange of information between information systems in operational and energy supply monitoring. The following main tasks were solved in the mutual integration of the software complex and devices for remote control developed in energy supply monitoring:

• System administration of networks and technical support of equipment;

• equipment service and emergency repair;

• installation of equipment, installation and configuration of operating systems and programs, start-up;

• control of work with submission of reports;

• technical and user support, advice; ability to outsource remote work.

Hybrid energy production with renewable energy source is complex and signal transformation elements, control systems and devices are simulated and physical, in the integration between the equipment and the pwcontrol.uz system, mainly based on the sensing elements of the Arduino microcontroller, about any energy supply devices. reads the data and sends it to the server based on the GSMsim800 brand module, turning it into numbers in the form shown in the picture above.

It sends and receives information about energy supply sources in digital form in the 16-digit number system. To be more precise, the template of the recognition sequence of each device is permanently defined, and when sending a message based on this template, information is sent about the activation of the available energy supply source and the parameters of the resources at the same

time, and when the opposite message is sent, the source is sent. the command to delete and send information about the resource to the server is executed.

The main constituent modules of the software complex that implements the simulation and physical operation of the hybrid power generation complex and signal transformation elements, control systems and devices, equipment and remote monitoring of the pwcontrol.uz system are as follows:

- Device management module;
- Power supply parameters and characteristics module;
- Real-time monitoring module;
- Parameter calculation and decision-making module;
- Hybrid power supply management module;
- Includes functional requirements for the program:
- The operating system is one of the optional distributions designed for windows server or linux server;
- PostgreSQL 9.5 or higher Web server apache or ngix for database management system;
- The server must be connected to the Internet and the Internet speed must be at least 100 Gbytes.

The structure and characteristics of remote device control commands through the program:

This system was developed using web technologies designed for client-server architecture. All data and commands are executed on the server, that is, all processes are performed by the application program on the server. In this case, the user can log in to the system through a web browser from any point and manage the devices. In this case, a special account is required for the user. After that, by entering the following commands into the system, the operation status of the renewable energy hybrid power generation complex and signal conversion elements, control systems and devices is controlled based on the stationary and mobile simulation and physical equipment and the pwcontrol.uz software system on the basis of remote devices.

The application and the device are integrated using special APIs. Commands are sent to the device through special codes, and the result of the device is returned in the form of status. Each API is considered connected to the control commands in the system. The RESTful API service is used, and with the help of this API, information is integrated between the backend and the frontend. All APIs work based on the https protocol. In APIs, data is exchanged in JSON format, that is, data sent from the backend is converted to JSON. As a result, the data is converted to a Javascript object after reaching the frontend. After that, the information is presented to the user. All APIs except login /api/login exchange information with a token. JSON-web-token is used as token. The purpose of this token is to allow only logged in users to retrieve data using the APIs.

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