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DEVELOPING AN AUTOMATED ELECTRIC DRIVE SYSTEM FOR AN ELECTRIC VEHICLE

Abstract: This article presents a design for an automated electric drive system for an electric vehicle. The electric drive system comprises a brushless direct current (BLDC) motor, a MOSFET driver for motor control, and an automatic regulator consisting of a set of sensors and a programmable controller. With further development to achieve full automation, the proposed device has the potential to enable the creation of autonomous transportation systems in compliance with all safety and reliability requirements.

Keywords: autonomous transportation, automation, electric drive, driver, controller, electric vehicle.

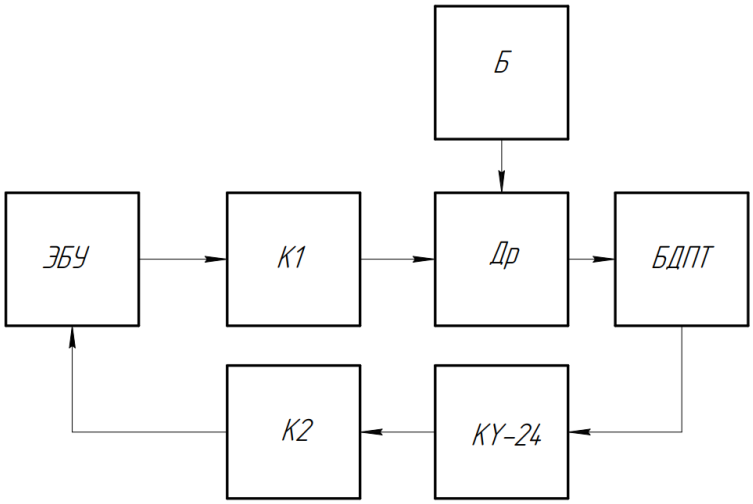
The control system is an organized set of tools designed to gather information about the controlled object and influence its behavior to achieve specific goals. These goals can relate to both technical objects and individuals. The object of the control system can be either a single entity or a composite object consisting of other interconnected elements. These elements may have a consistent structure of relationships among themselves.

The object of control can be any dynamic system or its model. This object has a state described by a set of quantitative variables that change over time, known as state variables. State variables reflect the current state of the object and play a crucial role in the control process, as their modification allows achieving desired goals and regulating the system's behavior.

The goal of managing electric transport systems (ETS) is the efficient movement of a vehicle from the initial to the final point of the route within a specified time interval, while ensuring compliance with traffic safety requirements and minimizing energy consumption. To achieve this goal, it is necessary to control the speed of the ETS.

A device for creating a Level 3 automated unmanned transport includes an engine driver for motor control, an Arduino controller for transmitting motor speed data to a computer that simulates the vehicle's electronic control unit.

An automatic controller is a key component of an automatic control system. It typically consists of sensors that measure the current value of a parameter, a comparison block, and a control block. Automatic controllers can employ various algorithms and regulation strategies, including proportional-integral-derivative (PID) controllers, adaptive controllers, and others.



Schematic Diagram of Automated Electric Drive Control

Annotations on the diagram: ЭБУ - electronic control unit, K1 - controller for transmitting signals from ЭБУ to driver Др, Др - driver for motor control, БДПТ - brushless direct current motor, KY-24 - Hall effect sensor module for converting motor rotation speed into an electrical signal, K2 - controller for transmitting motor speed signals to ЭБУ, В - power supply unit for БДПТ.

This scheme provides reliable feedback, and the modularity of system elements ensures reliability and ease of repair. The electronic control unit must meet requirements for speed and reliability and have functionality for programming and adapting to new sensors and auxiliary controllers. Auxiliary controllers K1 and K2 are needed to offload the load on the ECU and speed up the overall system operation. In the laboratory setup, ESP8266 controllers are used for research purposes. In laboratory conditions, a computer acts as the ECU.

The laboratory setup demonstrates high performance, reliable operation, and compliance with all safety requirements. The development of this device will

allow for the creation of a model of an autonomous electric vehicle. Further development in this field may lead to the creation of more efficient and environmentally friendly electric propulsion systems for electric vehicles.

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