поступающих векторов входных данных, их сравнении и классификации, что позволяет обучаться нейросети без учителя и во время ее эксплуатации. При этом стоит учесть, что на эффективность работы не будет влиять тип входных данных.

Многие люди привыкли работать со статическими объектами и мыслить категориями состояний. Суть больших данных другая, появляется необходимость работать с непрерывным потоком данных, введение нейронных сетей и обучение их во время эксплуатации ускорит процесс обучения и повысит эффективность обработки.

Взаимодействие больших данных и нейросетей становится всё актуальней с каждым днем. Уже сейчас большое количество подручных предметов генерирует потоки данных, с которыми нужно работать, поэтому необходимо стремится к адаптироваться и в полной объеме использовать возможной взаимодействия с большими потоками данных.

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УДК 681.1

FEATURES OF THE DEVELOPMENT OF ENERGY-EFFICIENT SCARA ROBOT

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The high-energy efficiency class of industrial equipment is a crucial aspect of its application, both in terms of economic and environmental efficiency. This article aims to discuss various techniques for developing energy-efficient SCARA robots. Implementing energy-efficient robots can lead to a significant reduction in production costs, resulting in lower product prices and increased profits for companies.

One of the techniques for improving the energy efficiency of SCARA robots is by changing the layout of the engines. Specifically, the engine responsible for the rotational movement of the second link is installed in such a way that its weight does not create an additional load on the engine of the first link at the base of the SCARA robot. The proposed arrangement of the drives is shown in Figure 1.

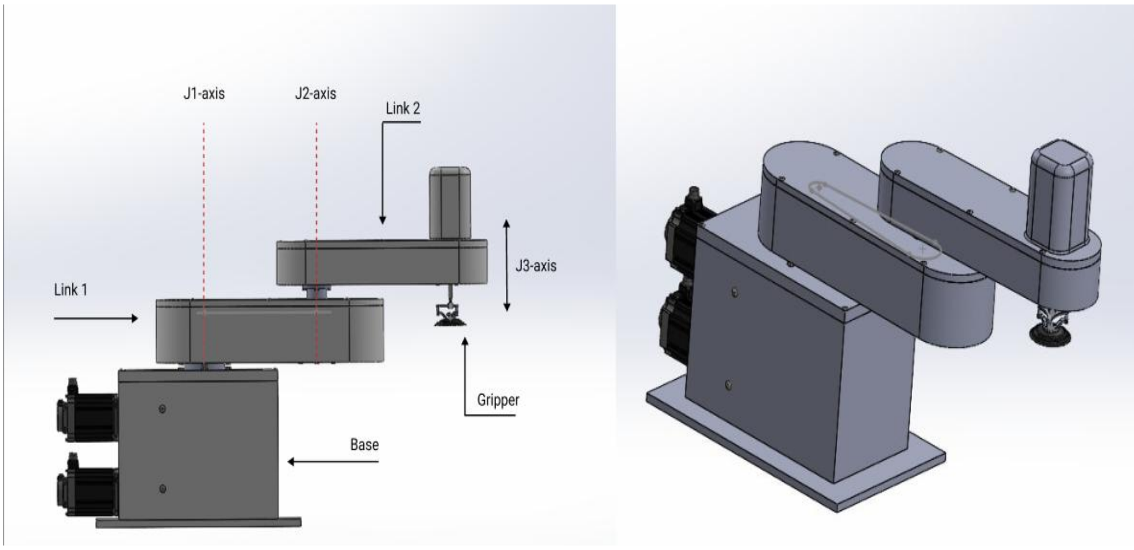

Fig.1. General view of the SCARA robot

The first link of the robot performs rotational movement in the horizontal plane. Meanwhile, the second link also rotates in the horizontal plane and regulates the distance between the axis of rotation of the first link and the axis of movement of the gripper by its angular displacement. Both links are driven by synchronous servomotors, with bevel gears used to transmit rotation from the servomotors. Notably, a hollow shaft is present in the proposed layout, which transmits rotation from the servomotor to the first link. The shaft of the second link passes inside the hollow shaft, and a belt drive pulley is fixed at the end of this shaft, enabling the rotation of the second link. A vacuum suction cup is used as the catch, which performs reciprocating motion with the aid of a pneumatic cylinder, expanding the possible application area of the robot.

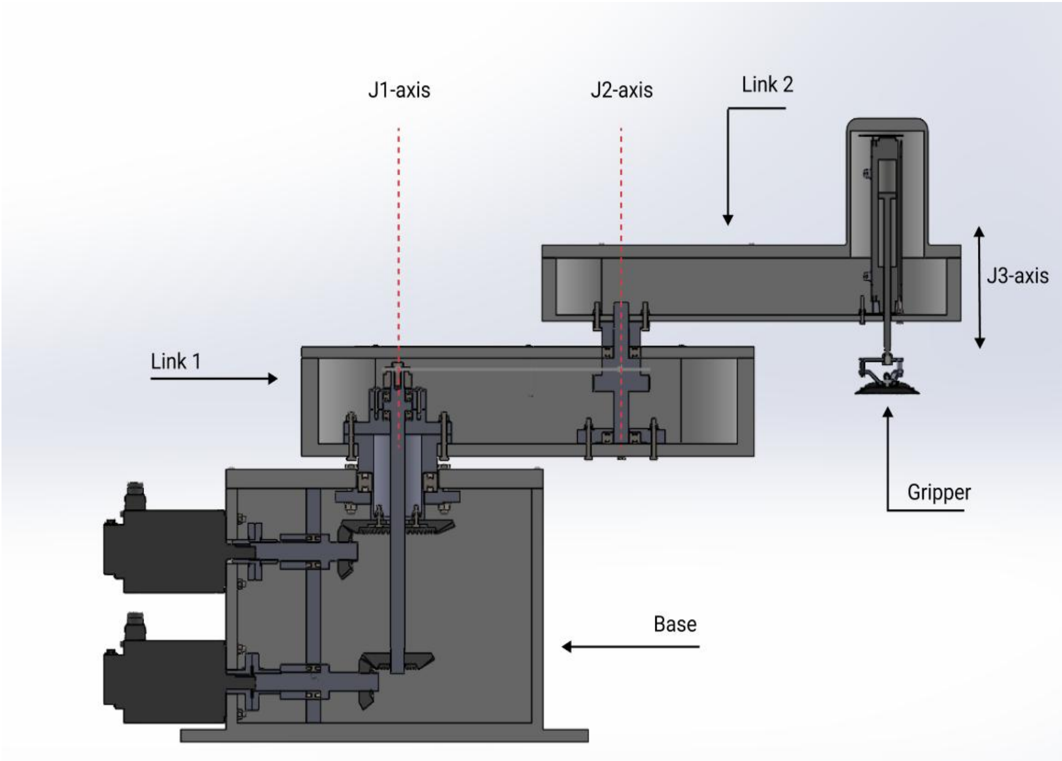

Fig.2. View of the SCARA robot in the section

As part of this development, the wiring diagram of the SCARA robot control system is shown in Figure 3. Festo CMMT-AS servodrives UZ1 and UZ2 were selected to control the Festo EMMT-AS servomotors M1 and M2. To improve operational efficiency, data exchange between the drives and the PLC will be performed using the EtherCAT protocol. To achieve this, a Beckhoff CX8090 PLC N1 was chosen, which is equipped with two expansion modules for digital inputs and outputs, namely KL1104 and KL2114. Additionally, reed position sensors B1 and B2, which track the position of the pneumatic cylinder, and pressure switch PM1, which receives a signal indicating that the catch has pulled the part, are connected to discrete inputs. The valve V1 for controlling the pneumatic cylinder and the ejector VG1 for creating a vacuum on the suction cup are connected to discrete outputs.

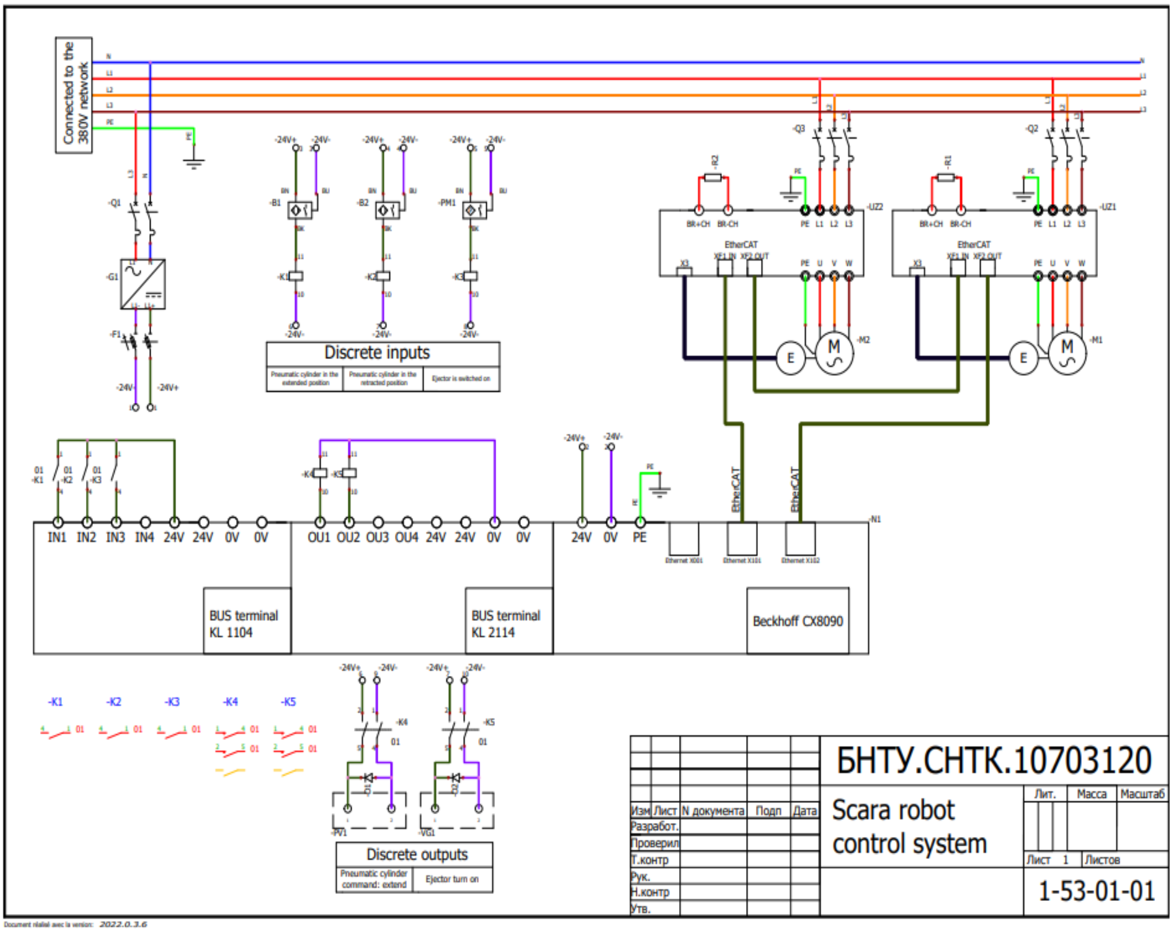

Fig.3. Electrical wiring diagram of the SCADA robot control system

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