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STRUCTURE AND DATABASE OF THE INTERNET OF THINGS NETWORK FOR MILK QUALITY CONTROL

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One of the approaches for assessing the quality of milk is the calculation of indicators based on critical control points (CCP). The main indicators of milk quality can be used as such points: fat, protein, SOMO,

dry substances, density, lactose, added water, etc. These indicators are collected and analyzed within a single farm using computers, which corresponds to automation 3.0 [1].

The structure such decision is presented and the architecture of the IoT network is described. The analysis of the database and DBMS structures is carried out. A more modern solution is needed, monitoring of milk quality indicators using the Internet of Things (IoT) network, which corresponds to automation 4.0 [2].

The structure of the IoT network includes milk analyzers, gateways-converters, a cloud platform, and mobile devices. The database of the cloud structure server stores milk quality characteristics, and the knowledge base stores the rules for processing them. The solver outputs deviations from the current milk quality indicators from the standards. The site is used for communication of specialists in milk quality control. Monitoring of milk quality characteristics is implemented from mobile devices.

The structure of the network of IoTs for milk quality control has been developed [3]. It includes portable milk quality analyzers for taking indicators from each of the controlled farms. In the structure, these indicators are fed to the gateways-converters. The latter are necessary for converting and transmitting the captured milk quality indicators to the cloud environment. A server is involved in the cloud environment. The server contains a database, a solver, a website [3].

The data structures of the removed milk quality indicators are presented for relational representation in the database for their further display on the site pages. The solver generates messages if the milk quality indicators go beyond the control limits.

The principles of forming database tables for the main controlled indicators of milk quality are considered. The descriptions of the fields of the database tables are presented.

Google Cloud Platform is a set of cloud services provided by Google that can be used to create and process data. In addition to management tools, a number of modular cloud services are also provided, such as cloud computing, data storage, data analysis and machine learning [4].

The process of creating an Internet of Things network and adding devices to it is demonstrated. Sensor data is generated by the Coral Environmental Sensor Board and transmitted to the IoT Core via the MQTT protocol. Sensor data is automatically published to Pub/Sub IoT Core. The data published in Pub/Sub automatically launches a cloud function that processes the data and stores it in BigQuery [5].

The steps of the procedure for configuring the connection of sensors are given, data from the sensor connected to the Resbery Pi is sent to Google Core IoT and then stored in the BigQuery database.

The structure of mobile application forms for operational and emergency notification of the farm manager for milk quality control is given.

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