U.A.VISHNIAKOU[1], A.H.AL−MASRI[1], S.K.AL−HAJI[1]

INTERNET OF THINGS MODEL AND STRUCTURE FOR MILK QUALITY CONTROL

[1]Educational institution "Belarusian state University of Informatics and Radioelectronics", Minsk, Republic of Belarus

When automating the management of dairy production, remote control of milk quality is used, which must meet international standards. One approach for evaluating milk quality is to use critical control points. These points can be used as the main indicators of milk quality: fat, protein, SOMO, dry matter, density, lactose, added water, etc. For automation the task of milk quality control, authers are developing an Internet of things (IoT) network [1].

Authers use a multi-agent approach to represent the network model for monitoring milk quality [2]. In this multi-agent structure, it will identify a set of agents for milk quality sensors, converter agents, storage agents for quality indicators and monitoring agents for these indicators.

Based on this model, the structure of IoT network is developed. It is composed of portable analyzers for quality of milk from each of the monitored farms. These analyzers usually send the results to a computer or printer via a serial port. In our 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 (CE). In the cloud environment we use the server. The CE server contains the data base (DB) and knowledge base (KB) The received milk data by time (milking and time of day, days), from different farms, possibly from different herds of cows are stored in DB. The rules of milk data processing for receive the milk quality characteristics are stored in KB.

Each of the mobile devices has an application that allows you to display information of interest from the cloud database. On a cloud server, user can install a software system for making decisions on changing the content of cows to improve the quality of milk. Specialists can remotely monitor milk quality indicators from mobile devices.

The report provides an analysis of domestic and foreign milk quality analyzers, such as lactane 1-4 ISP. 220 and Lactoscan. Com com, which must be passed to the OSR for storage and further processing. To do this, it is proposed to use converters of the NPort IA5000A-I/o, NPort IAW5000A-I/o series and the MGate 5105-MB-EIP gateway, which support integration with the Alibaba cloud of the Internet of things platform Azure IoT exist or with the private cloud via the MQTT Protocol.

The Microsoft Azure IoT Suite offers both pre-configured solutions and the ability to configure them and create new ones according to project requirements. You can get security mechanisms, high scalability, and integration with any existing or future systems. The platform allows hundreds of devices from various manufacturers to connect, collect analytical data, and use Internet of things data for machine learning purposes.

As a network for transmitting information from dairy farms to the cloud, we will choose the 4-LTE LTE network. NB-lot technology, within the LTE network, has a low data transfer rate, but a large coverage-due to the use of LTE network capabilities [3]. NB-IoT provides data transfer speeds from 20 to 250 Kbit / s, depending on what resources are used on the LTE network. Since this is only an extension of existing standards, N NB-IoT requirements are already available.

REFERENCES

1. Roslyakov, A.V. Internet of things: textbook. manual / A.V. Roslyakov, S. V. Vanyashin, A. Yu. Grebeshkov. - Samara, Pgutii, 2015. - 115 p.

2. Leighton-brown, K. multiagent systems: algorithmic, game-theoretic and logical foundations / K. Leighton-brown, Yu. shokham. London: Cambridge University Press. 2009. - 513 p.

3. Rentok, V. a Brief guide to wireless technologies "Internet of things". Part 4. long range / / Control Engineering Russia. 2018. No. 3(75). – Pp. 82-87.