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THE CURRENT STATE OF DEVELOPMENT OF WORLD SCIENCE: CHARACTERISTICS AND FEATURES

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SECTION 10.
AUTOMATION AND APPLIANCES MAKING

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DEVELOPMENT OF A SYSTEM FOR THE PRODUCTION PROCESS MONITORING USING TELEGRAM BOT

Modern trends in the production development within the Industry 4.0 concept framework the are based on the introduction of new information technologies into existing production processes [1]. One of the biggest challenges in implementing Industry 4.0 is to upgrade existing production lines to improve process monitoring systems, which consequently improves quality and cost-effectiveness by predicting production progress [2]. For such modernization, modern microcontroller modules, sensors and actuators are used, which allows receiving physical data in the "real time" mode, processing and transmitting them to the operator, and in the event of critical errors using actuators, they can affect production. To develop such monitoring and control systems, expensive equipment and software are used, the purchase of which is not always economically beneficial for a small enterprise, based on this, the authors proposed to develop an adaptive system for monitoring the production process, the block diagram of which is shown in Figure 1.

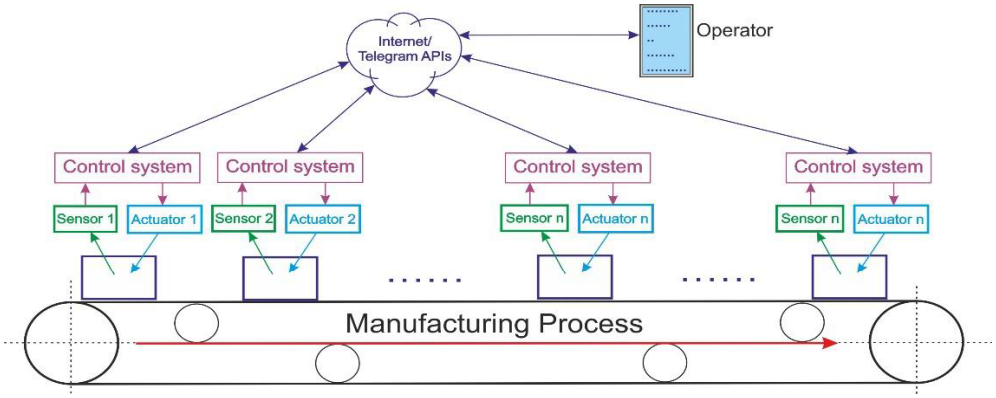

Рис 1. **Manufacturing Process Monitoring Block Diagram**

To create an economically attractive, but at the same time inexpensive monitoring system, it is proposed to use the necessary Sensors, the choice of which depends on the physical quantities that need to be monitored. The selected sensors are connected to the Control system via the general-purpose input/output (GPIO) interface [3] to the ESP32-WROOM-32 module [4]. The selected module allows to solve the following tasks: receiving and processing data from Sensors, built-in software for analyzing the received data, and in the event of critical parameters, it can control the Actuator; built-in Wi-Fi module connected to the Industrial Internet of Things (IIoT) [5] of the enterprise transfers data to cloud storage for analysis; Telegram Bot is used to poll the parameters of the current technological process in "real time" mode; emergency notification of the operator if manual intervention in the process is required. Based on this, a scheme was developed for connecting sensors BMP280 [6], HTU21D [7], and STH30[8] to ESP32-WROOM-32, in the Proteus Design Suite system [9], which is shown in Figure 2

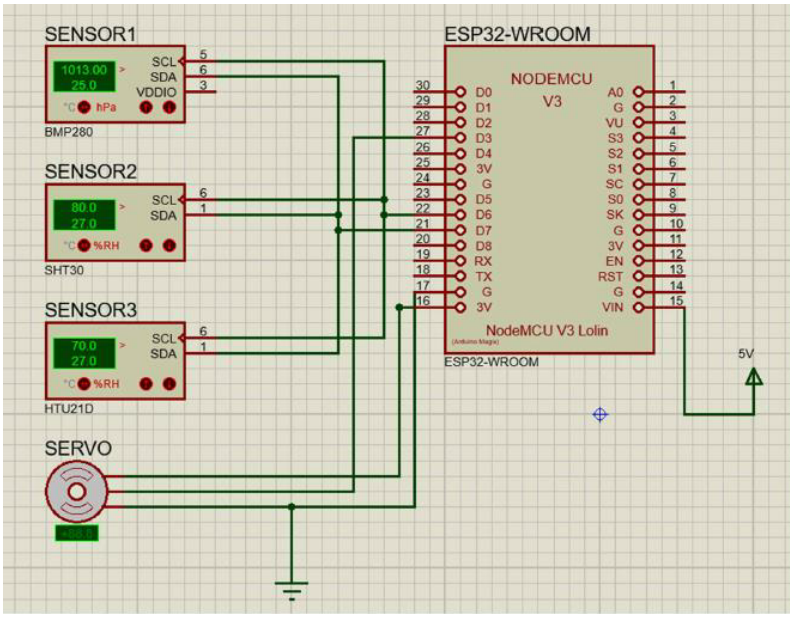

Рис 2. **Scheme of Connecting Sensors to the Module ESP32-WROOM-32**

Also, in the Proteus Design Suite system, the simulation of the developed connection scheme was carried out, in the future it is planned to develop a model of the printed circuit board of the monitoring module based on ESP32-WROOM-32 in the Altium Designer PCB system [10] and to develop a control program based on high-level programming languages [11].

Conclusions. In the course of a study on the modernization of production equipment to improve the methods of remote monitoring and the technological process flow control in real time, the authors proposed an alternative solution. The proposed solution has a number of advantages over existing analogues: inexpensive hardware; support for modern approaches to wireless networks for the technological information transfer, easy adaptation to the necessary needs of the enterprise and the use of free functions of the Telegram API. The authors plan to further develop an experimental module and conduct a series of studies to further improve and explore the area of their possible implementation.

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