UDC 631.811.98.006.91

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INFORMATION MEASURING SYSTEM OF WATER PARAMETERS

Abstract. This article gives information about the information measuring system of specific water parameters. And also gives overview on why is it important to use such system.

Keywords: Internet of Things, Information measuring system, water quality, ecological issues.

PROBLEM STATEMENT

Nowadays, it is widely spread that water is taken from reservoirs that may be affected by external factors, the need for quality control of these resources is a priority. At present time, the reservoir and the quality of the resource that is in it are not one hundred percent regulated by the governmental departments. Also, many of the reservoirs are bought for example for fisheries and do not have state control.

Due to the fact that most water resources are interconnected by underground sources, pollution of one body of water can lead to an environmental catastrophe for many others. Illegal discharges of wastewater into lakes and rivers lead to the death of fauna, and it is not uncommon for riverbeds to be blocked to draw water for production, which in turn leads to overdrying of the riverbed and the transformation of rivers into swamps.

WHY DO WE NEED SUCH A SYSTEM

It is worth starting with what is Information measuring system(IMS) and why it is needed. As of now, more and more companies are using systems that allow them to investigate specific fluid parameters. Every year, environmental standards increasingly control the production of beverages, mass production of any food and non-food products, chemicals, and their wastewater. Quite often lakes contain human waste, such as plastic wrappers from food, drinks, or cigarettes. An example of surface water quality is given on Fig. 1. Water pounds quality.

Fig. 1. Water pounds quality

Also, there is the problem of deforestation, which in the spring leads to the fact that along with the snow to the rivers get chemicals that tilled the land, because many neglects the minimum distance from the place of cultivation and planting to the reservoir.

That is why a system for monitoring the quality of water resources is so necessary.

The IMS provides an opportunity to signal the pollution of the reservoir, which in turn at least warns citizens that drinking water from a well is harmful to their health. Such a system will allow fisheries to understand that, for example, as a result of rising temperatures, too many algae have evolved, which over the established amount are toxic and deadly to fish[1].

These information measuring systems do not have the global drawback, because the sensors have high accuracy and data transmission occurs automatically at specified intervals. The only weakness may be that most of these systems are monolithic, which makes it impossible to replace an element in the field and after replacing the entire system requires recalibration.

One of the main parameters for the study of the aquatic environment is the pH level to measure this parameter, electrodes are used. The ones are connected to devices for data acquisition, some devices are mounted for example on a pipe through which the flow passes and the electrode measures in real-time and transmits obtained results over Wi-Fi to display changes in water quality.

The second, equally important parameter chosen is temperature and it measures with a portable waterproof temperature sensor[2].

Research of salinity and oxygen saturation of water is an important parameter for ponds and aquariums, as for the functioning of ecosystems, these parameters are very vital. Continuous monitoring systems are often used to study the quality of aquarium water, because some species of fish, especially tropical ones, are very sensitive to all indicators.

Probe for measuring a certain parameter - pH, dissolved oxygen, temperature, turbidity, etc. The probes are an analog device whose resistance varies depending on the measured medium. For example, the change in resistance of the thermistor depending on the ambient temperature. Measurement accuracy is not less than 1%.

Transmitter - GSM / GPRS modules, uses a SIM card to transmit data on the location of the sensor and transmits the necessary information parameters every 5 - 10 seconds (Maximum distance), Wi-Fi module has a small compared to the previous range but allows you to transmit data over long distances (Average transmission radius), Bluetooth (smallest transmission radius), radio wave (Second in transmission radius after GSM / GPRS module) or direct-wired data transmission to a personal computer or reader.

Relevance to use IMS lies in the fact that it provides an informative indicator for assessing the quality of the measured fluid can be used both for a single user and measurement for continuous measurement of transmission parameters to a PC user for further calculations.

The main advantage of IMS is the accuracy and parameters of measurements are measured values - turbidity, alkalinity, temperature. The range of impurity concentration measurements: 0 - 10 μm[3]. Temperature range from +5 to - 99 ℃.

Temperature - absolute measurement error – not bigger than 0.1 and pH - error not bigger than 0.15. As well as impurities (mechanical) - error not bigger than 5%.

The limit of the allowable main consolidated measurement error is 0.5.

The additional error from the change of ambient temperature from 0 ºC to the maximum value of the operating temperature for every 10 ºC does not exceed half of the allowable main error[4].

If necessary, the modules can be changed to obtain other informative parameters.

Thus, the presence of this system in the enterprise allows it to obtain accurate and timely results without the need to call professional and expensive mobile laboratories. But it provides an opportunity to monitor the state of the aquatic environment and inspect the change of parameters in certain time intervals for quality control.

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