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# USE OF INTERNET OF THINGS TECHNOLOGIES IN PIPELINE WATER SUPPLY SYSTEMS

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**Abstract**
This research article describes the main types of sensors used in Internet of Things (IoT) plumbing systems. The advantages of using IoT technologies in water supply systems have been studied. Technologies and tools for solving problems of water supply networks using IoT were also analyzed.

**Keywords**: Internet of things, pipeline, sensor, machine learning, data analysis, water parameters.

## Introduction

In recent decades, the development and application of Internet of Things (IoT) technologies has opened up new opportunities for effective management of processes in the field of water resources, optimization and control of infrastructure, as well as significant cost reduction [1.2].

IoT is now becoming increasingly popular and is having a significant impact on various industries, including plumbing. IoT is a network of physical devices connected to the Internet that exchange data and interact with each other without human intervention [3]. In the context of water networks, IoT enables the creation of intelligent control systems that ensure efficiency, optimization and reliability of water supply.

IoT sensors can continuously monitor the flow of water in the network and detect even the slightest leaks. It is also possible to detect illegal use of water or unauthorized access to the system. Quick detection of such problems allows you to quickly take action and prevent losses.

Sensors play an important role in IoT water systems by collecting data on water quality and quantity. They measure various parameters, such as water level, pressure, temperature, chemical composition and other characteristics [4].

The main types of sensors used in IoT water systems include:

**Water level sensors:** Measure the water level in reservoirs, tanks or pipes, allowing you to monitor water supplies and prevent overflow or depletion.

**Pressure Sensors:** Measure water pressure in pipes, allowing you to monitor and optimize water flow and detect leaks or unexpected changes.

**Temperature sensors:** Measure water temperature, which allows you to monitor and regulate thermal processes and prevent damage to equipment.

**Water quality sensors:** Detect parameters such as pH levels, chemicals or impurities in water, allowing you to monitor water quality and detect contaminants or problems in water treatment.

Benefits of using IoT technologies in water supply systems:

- Wireless monitoring of the water supply system;
- Optimization of water and energy consumption;
- Water quality management;
- Leak detection and improved accident prevention;
- Forecasting and preventing problems.

Examples of application of IoT technologies in water supply systems:

- Smart water meters;
- Monitoring and remote control systems;
- Automation of water filtration and purification processes;
- Sensors for leak detection and water quality control;
- Data analysis and forecasting to optimize processes.

The following are the benefits of IoT technologies for water pipes[5]:

*Remote monitoring*. IoT sensors can be used to monitor water and wastewater infrastructure, such as pipes and wastewater treatment plants, in real time. This can help identify potential problems before they become major problems, reducing the need for manual checks and minimizing downtime.

*Preventative maintenance*. IoT sensors can provide data on the health and performance of equipment and machinery, allowing for predictive maintenance and reducing the risk of unexpected breakdowns.

*Advanced asset management*. IoT sensors can be used to track the location, condition, and maintenance history of assets such as vehicles, equipment, and tools. This can help ensure assets are properly maintained and maintained, extending their life and reducing downtime.

*Increased security*. IoT sensors can be used to monitor work sites and detect potential safety hazards such as gas leaks or equipment failures. This can help prevent accidents and keep workers safe.

**Technologies and tools for solving water network problems with IoT.**

The implementation of IoT water systems requires the use of various technologies and tools to effectively solve problems.

Below are the key technologies and tools used in IoT applications in the water network:

Machine learning plays an important role in processing and analyzing data obtained from sensors in the water supply network. Using various machine learning algorithms, anomalies can be detected, potential problems can be predicted, and preventive measures can be taken.

Data analytics allows you to process large amounts of information collected by an IoT system and extract valuable insights [6].

Data analysis allows you to identify trends, patterns and correlations between various parameters of the water network, which helps you make informed decisions to solve problems.

IoT systems make it possible to effectively manage water flow in the water supply network. Using water consumption and flow data, smart control systems can optimize pumps and valves to minimize losses and improve efficiency.

IoT technologies allow remote control of the water supply network. Operators can monitor and adjust network parameters from a remote location, making maintenance and problem solving easier.

**Conclusion**

The application of IoT technologies in piped water supply systems represents a promising and necessary step towards creating smart and efficient infrastructures.

IoT allows you to optimize water consumption by monitoring flow, detecting leaks and controlling pumps in real time. Early detection of faults and preventive maintenance minimize the risks of downtime and water loss.

Monitoring pressure, water level and quality helps ensure consumer safety and prevent accidents. Integrating IoT into water supply systems is an important part of the development of smart cities and improving the quality of life of citizens.

The further development of IoT technologies makes it possible to develop more sustainable, cheaper and energy-efficient sensors, devices and platforms. Integration with other systems: Creation of a unified IoT infrastructure to manage all aspects of urban management. Development of new algorithms and analytical tools to optimize resources and manage risks.

The application of IoT in piped water systems opens up new opportunities to improve the efficiency, safety and sustainability of water supplies. This is an important step towards creating smarter and more sustainable cities of the future.

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