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AUTONOMOUS WATER LEVEL GAUGE: ASSEMBLY AND TESTING ON THE OREDEZH RIVER

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Monitoring water levels in water bodies is essential for flood forecasting, water resource management, and coastal safety. Traditional measurement methods require regular maintenance, limiting their use in remote areas. Existing alternative approaches are often complex to operate and expensive. Therefore, the development of an affordable, autonomous, and reliable level meter is urgently needed. The aim of the study is to develop and field test an autonomous water level measurement system, substantiating decisions on component selection, calibration, adaptation to field conditions, and processing of the obtained data. To achieve this goal, the following tasks were completed: 1) develop a device design that minimizes component costs compared to existing analogs; 2) ensure autonomous operation through a combined power supply; 3) implement data transmission via SMS for real-time monitoring; 4) conduct field testing of the device. The implemented system is based on the hydrostatic method of liquid level measurement. The design is based on a perforated metal support, supporting three functional units and a measuring sensor. The lower unit houses a battery compartment with lithium-titanate batteries, the middle unit houses a SIM800C communication module for data transmission, and the upper unit houses an atmospheric tube outlet for pressure compensation. To protect against damage, one cable segment is routed through a sealed polypropylene tube. Calibration was performed by comparing the readings from the measuring sensor with those from the calibration sensor and the marked hydrometric rod. Level conversion was performed using theoretical and empirical coefficients, taking into account the maximum output voltage of the sensor and the voltage drop in the system. The system is also equipped with an air temperature sensor. The received data is transmitted every three hours in two ways: via SMS and to a MySQL database. After recalculation, the information is sent to the website and displayed as graphs, allowing for convenient remote monitoring. As a result of this work, an autonomous hydrostatic level gauge was developed and field-tested on the Oredezh River. The proposed design demonstrated operability with a combined power supply, reliable data transmission via SMS, and the ability to integrate with a web interface.

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