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Processes of Data Collection and Automation of Drinking Water Meters in the Republic of Uzbekistan

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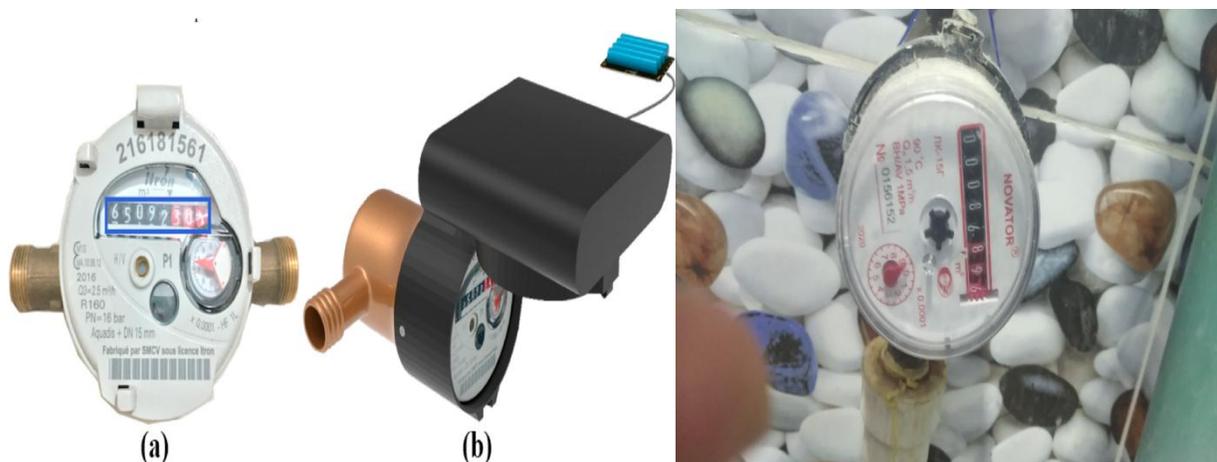
***Abstract:** Currently, with the increasing demand for water resources in the Republic of Uzbekistan, the need for monitoring is becoming reasonable and necessary. In our country many conditions have been created for sustainable use of this resource. Collecting water meter data is one of the important steps towards this goal. On the whole, consumption is calculated based on the average consumption recorded in previous months causes many customer claims due to high invoices, which do not reflect the reality. In this article we have proposed a complete process-based system to automate water meter data collection. Technological we update counter data through system-based and web services platform. This system offers several services for customers and water. Of these service providers, such as consumption monitoring, water pressure detection, water consumption visualization and the level of drinking water coverage on the geographical map consists of determining the volume of water from the border area. It also provides a powerful tool to help you make the right decision. In these studies research was conducted with several reporting services. The main component of the water meter is a convolutional neural network and the model consists of reading the proposed automatic counters and comparing them with the values represented in the data set. We are in the model testing phase achieved 97% accuracy. Our system was tested through experiments and we tried to explain it based on the research of several developed countries in the world.*

***Key words:** Automatic meter reading, water meter,telemetry, energy harvesting,embedded system diagram, flow measurement, water consumption consumption indicator.*

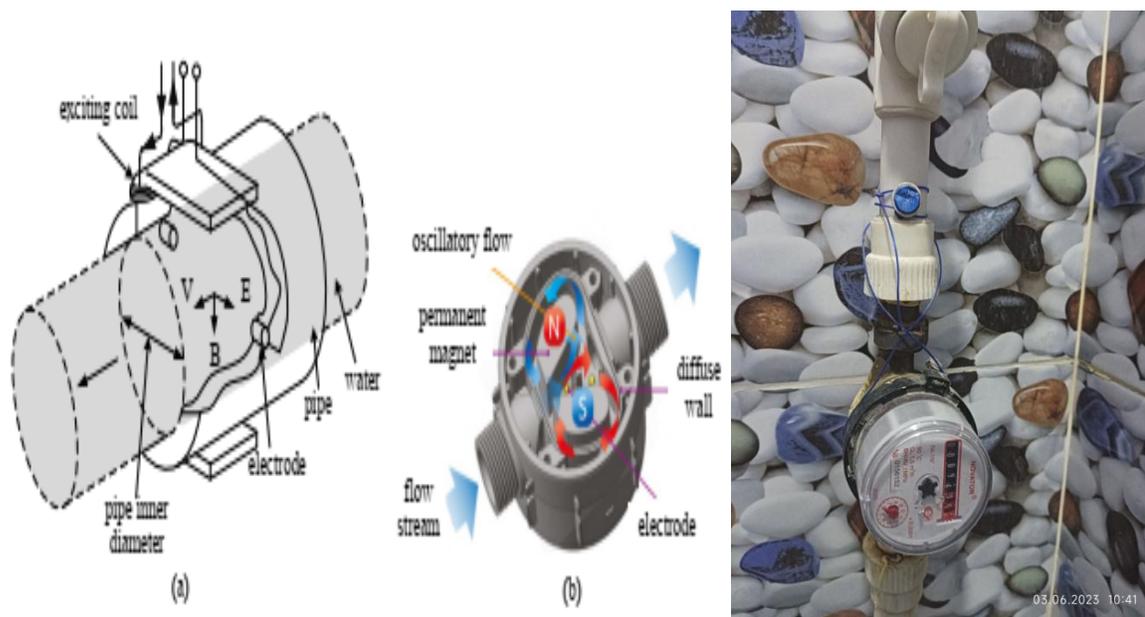
Introduction

Currently, in the Republic of Uzbekistan, it is proposed to use a number of advanced technologies as a form of urban development for the integration of modern technologies. In the age of advanced technology technologies such as information and communication technologies and Internet of Things

technologies shapes the city in a safe way of management. Management includes Residential / commercial buildings, schools, libraries, transportation, hospitals, power generation/distribution networks, water supply examples include utilities, waste collection/transport/disposal, law enforcement and other community services. Otelbayev Azizbek, a student of the Nukus Mining Institute in the city of Nukus, Republic of Karakalpakstan, conducts several studies on the use of real time data from water meters and develops an interactive platform for calculation methods. people have formulated theories on urban management with significantly improved efficiency compared to the traditional method. We humans can think humans cannot change the amount of water on earth. However, in many sectors of industry, for example, the demand for agricultural and household products is increasing, and the use of this resource has changed its mode and its naturalness activity, it is a vital resource, especially for drinking water that has to go through a series of expensive treatments removes all impurities before human consumption. Hence the rationalization use of this resource should be carefully considered. The growth of many technical fields such as the Internet of things, artificial intelligence and Big Data have made several complexes easier problems in recent years, such as remote water meter data collection and use modern meters to monitor water usage. Nowadays, modern computing and measurement technologies are widely used in the Republic of Uzbekistan. Water lines to the distribution network, the meter available in all consumer connections, based on this modern measurement system, water meters that have passed GOST standards are used. Modern water meters can be retrofitted or fully integrated solutions can be implemented. A retrofit approach means that a new electronic device or module must be connected to an existing mechanical water meter, automated water we need to set up a system to measure flow rate, record water usage data and connect them wirelessly. Recently fully integrated water the meters already include these automatic meter reading capabilities in the built-in metering electronics. The current and growing interest in dsatlabki solutions for water meters needs to be structured around emerging Internet-based communication protocols and technologies, such as low-power wide area networks. Technology indicator will have long-range and effective penetration. Several methods are proposed in the paper to minimize node energy consumption in wireless sensor networks. Access to an energy-saving tool, such as duty cycle planning, which effectively affects the sensor's lifetime it is necessary to ensure control and energy efficiency. Another approach is to recharge the sensor nodes through energy harvesting, from the environment (water/wind flow, light, thermal gradients, vibrations, etc.) and convert it into electrical energy there are also several advantages to using it to power electronic components. There is great potential in the integration of energy harvesting technologies, can lead to environmental and technological benefits by increasing battery life or reducing power. It should be noted that existing commercial modern water meters still rely only on the use of internal batteries and rather than benefiting from energy harvesting technologies, and to our knowledge, no commercial water meter incorporates or studies energy harvesting technologies. Recently, there has been mainly stimulating research in this area, related to the study of small-scale micro-turbines designed to harvest energy from water flow. These studies presented interesting results proving that a small water turbine can provide large amounts of power, which can result in a self-powered system.



Picture 1. (a) Water meter without integrated system (b) Water meter with integrated system. (The picture of the water meter used in the Republic of Uzbekistan is presented. The picture was taken in the house of Otelbayev Azizbek, Kiet village, Kungrad district, Republic of Karakalpakstan.)



Picture 2. Structure scheme and types of water meters currently used in the Republic of Uzbekistan a) electromagnetic meters; (b) liquid impact gauges.

Most water meters different from the installation of the meter from the water flow chamber. They are called full water consumption meters. Due to the magnetic coupling mechanism, the effect sensor can actually be used to detect and the rotation of these magnets inside the meter ensures the full operation of the counting system. For example, sensors with two additional effects used to develop a modern water meter while reducing the impact of environmental degradation we can use signals. In addition, the magnetometer performs the same function. Main water meter manufacturers also supply special water meters that separate the flow direction for magnetized water. Obviously, modern water meters require electricity to power electronic circuits. In literature, most designs accept a hard-wired power supply or replaceable batteries. Self-powered scale suggested in the sensor; however, it is limited to small pipes with internal use. Separately study, a direct current motor is adopted for power generation.

However, it has a critical side problem because it requires compressive force in the tube to connect the DC motor. Water meters presented a modern meter powered by electromagnetic and piezoelectric energy harvesters. However, the design requires changing a large water pipe and it is not possible for a small water pipe. In addition, if the water quality is poor, its performance will be adversely affected. System platform It has been proposed to monitor various parameters of water quality with energy harvesting, including pressure, temperature, pH, conductivity, flow rate, and micrometric layer thickness are emphasized. Invited the platform can provide excellent sensing resolution at the expense of expensive hardware components and it can also measure large flow rates.

Conclusions

Modern water meters that automatically calculate water flow consumption have been developed using a turbine generator via Bluetooth we can use to create a system with a cost-effective solution for managing water resources in villages. In the Republic of Karakalpakstan implemented prototype, corresponding flow rate measurement range [300 750] L/h. Mobile app designed to deliver real-time information to the user's smartphone. Also, calibration a modern water meter can be made by changing the variables in the modeling equation so that it allows we can also use it in other fluids and pipelines for industrial applications such as oil refineries and beneficiation in various production areas. In addition, other sophisticated sensors can be added to the turbine, which increases its capabilities in measuring flow, increasing accuracy and speed. We compared the results of a new hydrometer dataset containing different images and we encountered challenging environments for system training and testing. Extensive experiments have proven orientation adjustment module can effectively improve the number box and display and meter readings accuracy of detection; the spatial instruction module can effectively improve the number box, reading accuracy and fast execution. In addition, we performed quantitative experiments to verify the orientation and we have developed a counter-coupled system of computing module efficiency and spatial instruction module. In addition, we made extensive use of design and automation processes. We used in-pipe water flow pressure hydraulic press experiments to test the effectiveness of each module in the entire pipeline. Able to successfully read water meters automatically we have considered computational processes through applications, originating from high-resolution environments that meet application requirements. In future work, we will further improve the accuracy of automatic calculation and we improve existing processes to reduce failure. Otelbayev Azizbek, a student of the Nukus Mining Institute, is conducting research on the development of a computerized system for calculating water meters, hydraulic pumps, automated systems. The results of these studies provide the possibility of automatic monitoring of the computing system, which limits the unnecessary distraction of employees and automatically transfers the computing system to the computer system.

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