Prepaid Water Meter and Quality Checking

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Abstract — This water efficiency is considered important in all countries around the world, and many research projects (such as integrated water management) have been developed to improve water management. Therefore, smart water systems are designed to ensure the integrity of water, provide economic benefits for consumers and utility companies, improve management and achieve the highest water level. A prepaid water meter is a device that measures the drinking water of the homeowner who installs the device in his home. Saving water is a big issue for many homes. Public electricity meters are installed and the money received from households is more than the bills paid.

Keywords: Time Tracking, Cloud Storage, Microcontrollers, Internet of Things (IOT), Solenoid Valves, Turbidity Sensors, Sensors

I. INTRODUCTION

There is no doubt that water is one of the most important things in the world. No one, including humans, animals, plants and insects, can live without water. Water is a scarce resource that will disappear in the coming years due to overuse. Poor water quality, leaky water, leaky pipes, poor water usage, etc. are the main sources of wastewater. Therefore, in order to solve the problems related to water waste, it is necessary to manage waste and water usage by introducing or creating an Internet of Things (IOT) system. Water - water is the life of living things -. When used correctly, it will take us to the top, but its waste is very expensive in economic and human terms. City companies spend money each year on water purification and filtration for commercial and residential use. They also spend money on maintenance and repair of analog water meters. The IoT-based water quality and quantity management system can track each user's water consumption, control the automatic valve and water flow in real time, and charge customers based on their usage.

II. LITERATURE SURVEY

Gurung Ram proposed a paper that explored the application of smart metering to enhance the management of demand complexities in contemporary water supply methodologies. The focus was on optimizing the planning of water infrastructure networks [1].

G Hauber-Davidson discussed the role of smart water meters and their real-time monitoring capabilities for water consumption. The paper proposed taking action in response to the increasing cost of water [2].

Sarah Darby introduced the concept of affordance and applied it to qualitative research to understand how homeowners utilized consumption feedback, both with and without smart meters. The Advanced Metering Infrastructure (AMI) played a crucial role in transitioning to lower-impact energy systems, offering possibilities for household energy management and customer–utility relations [3].

Tracy C. Britton shared insights into improving water distribution systems for water utilities. The paper emphasized the reduction of water loss in the network, estimating customer post-meter leakage to be up to 10% of total water consumption. The conclusion highlighted the importance of identifying and addressing post-meter leakage [4].

E. Idris proposed a paper on Intelligent Water Metering (IM) and its potential to transform urban water management. The overview provided a balanced analysis of the prospects and pitfalls based on a review of IM deployment [5].

Cara D. Beal's paper highlighted a mismatch between householders' perceptions of their water use and their actual consumption. The study examined the contributions of end users to total water use among groups self-identified as "low," "medium," or "high" water users. Information was tailored to consumers based on their water bills [6].

The author introduced an IoT-based automatic On/Off system for water tanks, addressing the limitation of current systems unable to monitor water levels. The system activates when the water level is between low and high levels, and users can access the data on a website [7].

The author developed a low-cost system to monitor the quality and quantity of water for various purposes, including agricultural, commercial, and industrial use. The system collected data from sensors for analysis and provided solutions to water-related problems [8].

III. PROJECT CONCEPT

A. Water quality

Water quality refers to chemical, physical or biological properties of water. It is a measure of water relative to the needs of one or more species and/or human needs or purposes. It is often used in reference to the ability to evaluate the process of preventing compliance. Common criteria used to assess water quality relate to ecosystem health, human contact safety, and drinking water

B. Hardware Requirements

1) Arduino: Arduino is an open source electronics based on easy to use hardware and software. Developers can send instructions to the microcontroller. All Arduino boards are open source, allowing users to create their own boards and ultimately tailor them to their specific needs. There is an ATmega328P microcontroller chip on the Arduino/Genuine Uno board.

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Fig. 1: Arduino

2) Flow Sensor: A flow sensor is a device that detects and measures the flow of water in a pipe. The flow meter coordinates with the meter to measure the flow of water. Water flows through the rotor blades; the rotor will begin to rotate. Therefore, the output frequency produced by the pulse is proportional to the volumetric flow rate/total flow rate from the flow meter. The diagram shows the turbine diagram of the flow meter. A flow sensor is a flow meter used to measure the flow of water flowing through it.

Fig. 2: Flow Sensor

3) Solenoid Valve: Solenoid valve is used as water control valve, it is a simple electronic device that converts electric current directly into electronic devices. Solenoid valves are a combination of mechanical components and solenoid valves. Therefore, the solenoid valve consists of two parts: solenoid valve and mechanical valve. Solenoid valves convert electrical energy into electrical energy to actuate a solenoid valve to open, close, or adjust its position. The solenoid valve is shown.

Fig. 3: Solenoid Valve

4) Turbidity sensors: Turbidity sensors measure the amount of light scattered by particles suspended in water. Turbidity sensors used in water and flow measurement, wastewater and sewage measurement, sedimentation tank control instrumentation, sediment transport and testing. Turbidity is a measure of what the atmosphere is like. Turbidity refers to the degree to which the water is not clear. It is considered a good indicator for water quality. Turbidity blocks the light that underwater plants need. It can also make surface water warmer than normal because material suspended near the surface helps absorb heat from the sun.

Fig. 4: Turbidity Sensor

C. System Architecture

The project is divided into three modules, the hardware module includes a flow sensor, a solenoid valve, a turbidity sensor and a user interface. It is created by Arduino and other hardware that controls the flow. The Web server module contains servers such as Web server, database, and Web applications and is used to provide and store metrics. Website/Application: It has applications such as web or mobile applications for water usage tracking. The solenoid valve is used as a water control valve and is a simple electromagnetic device that directly converts electrical energy into linear mechanical motion. Solenoid valves are a combination of mechanical components and solenoid valves. Therefore, the solenoid valve consists of two parts: solenoid valve and mechanical valve. Solenoid valves convert electrical energy into electrical energy to actuate a solenoid valve to open, close, or adjust its position. The system will use internet-based methods to measure water quality and water use and provide accurate and timely water use information. In the previous method, workers would go to that place for a while and open the valve, then workers would return to the original place and close the valve, which was a waste of time. The strategy system is fully automatic. Energy and time are saved here. We use this method to ensure that everyone has access to the same water. It can also be used to prevent wastewater during application. The municipal water company will be a public utility that can easily and efficiently monitor drinking water. People will also receive information about their water use. Prepaid water meters will track each household's water use and consumption. The system will be installed in the water pipes of each building. It will monitor and control the water flow. We get instant usage information and can control valves to limit water flow. Users can view their usage at any time from the control panel or web application. The idea is to create a meter that counts the amount of water and sends it wirelessly to the server where the data is stored. The portal or mobile application accesses the data on the server and displays it to the client. Customers can interact with the web portal or mobile app to track usage, pay bills, or stop or start services.

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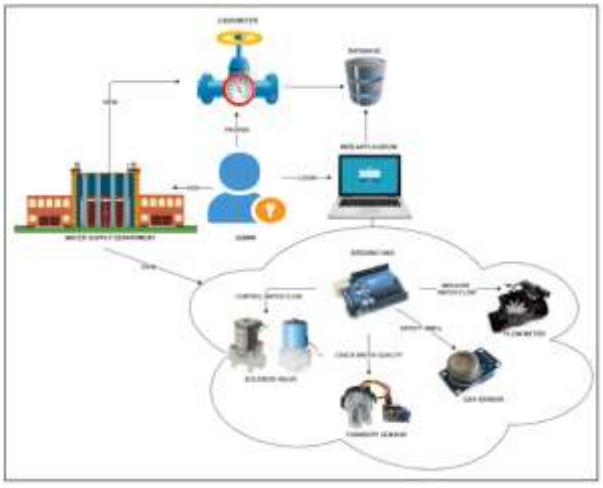

Fig. 5: Architecture

IV. CONCLUSION

This paper will demonstrate the success of internet-based preliminary testing, water quality testing, and immediate use. Flow sensors for water measurement overcome the shortcomings of traditional water measurement. Future improvements may include prepayment and automatic water purification, depending on the nature of the spill. The water meter system will recognize the electricity bill and eliminate the disadvantages of traditional water meters. This new concept can be extended to other areas such as oil and gas monitoring systems.

A. Future scope:

The process is both cost-effective and helps protect water from pollution. Future Scope The aim of this project is to identify pollution caused by various negative factors and propose solutions for cleaning water tanks. Biosensors can also be used to detect bacteria to improve water quality. When there is no credit left in the account, the balance will appear immediately and the water will be cut off.

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