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A Study on Smart Wireless Water Meter

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ABSTRACT: ***A smart water meter is a simple, everyday gadget that connects wirelessly to a local and wide area network to detect leaks or enable remote location monitoring, reducing water wastage. Smart water meters are devices that monitor how much water is used by the property owners who have installed them. Water conservation is a major issue in many apartments. Every family that is paying more should have a common meter that divides the entire amount of usage. There are several approaches to resolve this issue. Using gadgets to calculate the flow rate or amount of water used in homes and transferring that data to the cloud to track water consumption are solutions proposed by scientists in this study. The main objective of this paper explore more about smart wireless water meters and its advantage. In the future, this paper will aware people of smart wireless water meters.***

KEYWORDS: ***Cloud, Consumers, Water Management, Water Meters, Electronic Computing Unit.***

1. INTRODUCTION

Water management and accurate invoicing are made possible with smart water meters, which track and transmit water consumption from consumer to supplier. These meters have an electronic computing unit, as well as an ECU, to make it easier for the meter or provider to communicate. Smart water meters detect water consumption more accurately than traditional mechanical water meters using technologies such as ultrasonic or electromagnetic sensors. Although traditional metals including brass as well as copper can be used to manufacture these more sophisticated water meters, many OEMs are looking for watershed management systems to replace the metals, promoting lighter weight or promoting durability [1], [2].

Smart water meters are required even if conventional mechanical water meters have served their purpose well for many years. This is because consumers or manufacturers now want more from water management products. Smart water meters are enhancing people's lives all around the world by addressing issues like sustainability and recycling as well as the demand for more precise measurement. Smart water meters aid in addressing water shortage issues in Africa or the Near East, while in Asia they may be employed in a variety of end-use scenarios [3]. Smart water meters make it simpler for communities to find leaks or precisely measure water wherever in the globe. Additionally, these cutting-edge gadgets help customers by enabling them to precisely monitor their water use and guarantee appropriate invoicing. By reusing these devices after their service lives, OEMs may encourage sustainability by using smart water meters made of materials like thermoplastics [4].

1.1. Smart Water Meter Manufacturers Need:

Modern producers of smart water meters use cutting-edge materials to replace metal and produce water management systems that are more durable and effective. For smart water meters, specialty polymers provide a variety of advantages in terms of production and performance characteristics. Production procedures may be streamlined by using injection molding to create these particularly tailored materials. Specialized polymers for water meter

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parts also provide greater oxidative aging resistance, superior strength, good corrosion resistance, as well as benefits for light-weighting. As this equipment must retain strength or performance during their service life while safeguarding the integrity of the ECU, these performance features are crucial in the creation of smart water meters [5]–[7].

Solvay offers a range of specialty polymers for water meters that are designed to provide outstanding performance and durability in all environments. For smart water meters that come in contact with extremely hot water, Ryton PPS ensures outstanding dimensional stability and chemical resistance. Manufacturers rely on this polyphenylene sulfide to maintain design flexibility in the most extreme applications as this thermoplastic exhibits a low viscosity that makes it suitable for injection into thin-walled parts [8].

Though access to water is a basic necessity in our homes, unlike gas and electricity, we are unable to shop at cheap prices. This would mean that the cost is fixed and there is nothing we can do to change it, but this is not always the case as some people may find that switching to a water meter will help them reduce their water costs. The difference is that a water meter charges you only for the amount of water you use, whereas a non-meter supply has a fixed charge, no matter how much water you consume. Water management systems with intermittent exposure to hot chlorinated water can be developed with Solvay's Amodel PPA to guarantee performance superior to conventional polyamides. This polyphthalamide offers reduced moisture absorption, excellent resistance to creep and fatigue, and superior dimensional stability compared to conventionally used plastics.

In human history, no environmental disaster has ever been as severe as the one the world is currently facing. As a result, freshwater resources are depleted. There is an acute shortage of drinking water, and the sources are under unnecessarily high pressure. Given the current political climate, pricing may not be based on the actual cost of water supply or extraction. As a result, the tariff is quite reasonable. The existing slab distribution system for waterworks at one tariff. As we move to the upper slab, the rate increases by about 40.00%. There is no limit to the total volume used in the existing system. This system has failed because customers have strong purchasing power.

People propose a new slab system based on the total volume to be delivered in our project, the Smart Water meter employing wireless networking. The water board establishes restrictions (BWSSB). When a specified cap is reached, the water supply is immediately cut off entirely for that month. Consumers receive notifications in advance via the SMS system. Any malfunction or manipulation with the meter can be instantly found. The water supply Board can remotely open and close the distribution valve. On the local server, a database with user information and information on water usage is stored and updated every month. There is now no longer a requirement for other parties to obtain data because this database may be utilized for billing. Humans have also worked on the Raspberry Pi in the subsequent stage of technological development, which integrates more advanced technologies like IoT, WiFi, cloud databases, and web applications.

The Internet of Things (IoT) is described as a system in which physical items may participate actively and where services are accessible to communicate with these devices online. It makes it possible for machines to connect and interact with one another, with the environment, and with humans by exchanging data via the internet. A smart water meter detects the quantity of water used in a building or residence and has internet connectivity. In many flats nowadays, water saving is a major concern. The apartment association should take an effort to inform all

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inhabitants of how much water they are using. In this research, we presented a fix for the aforementioned problem that involves putting smart water meters in each home and apartment to track water use levels using IoT technology. Another issue arises when a common meter is installed in a complex and the homeowners are charged more than what is necessary to pay for the cumulative usage amount. They thus require a system in which fees are assessed according to the usage of each household rather than the aggregate of all fees. The smart meter for water consumption offers a solution to this issue by measuring the amount of water used by each household or enabling the user to keep track of consumption levels. People should avoid the aforementioned problems while installing this smart water meter, as well as monitor the water used online. If no one is home, the water supply can be cut off, which either directly or indirectly lowers energy use.

The meter interfacing node, gateway devices, as well as back-end system, make up the three main parts of the created system. Figure 2 depicts the components' both software and hardware architecture, which will be discussed in more detail in the following paragraphs. The intermediate node will transmit the meter reading to the back-end system through the meter-interfacing node, which is connected to the digital meter. The information is processed or stored in the database somewhere at the back-end system. Different types of graphs and tools are provided through a web-based interface to enable the monitoring as well as the study of water consumption. Figure 1 illustrate the hardware or software architecture for systems.

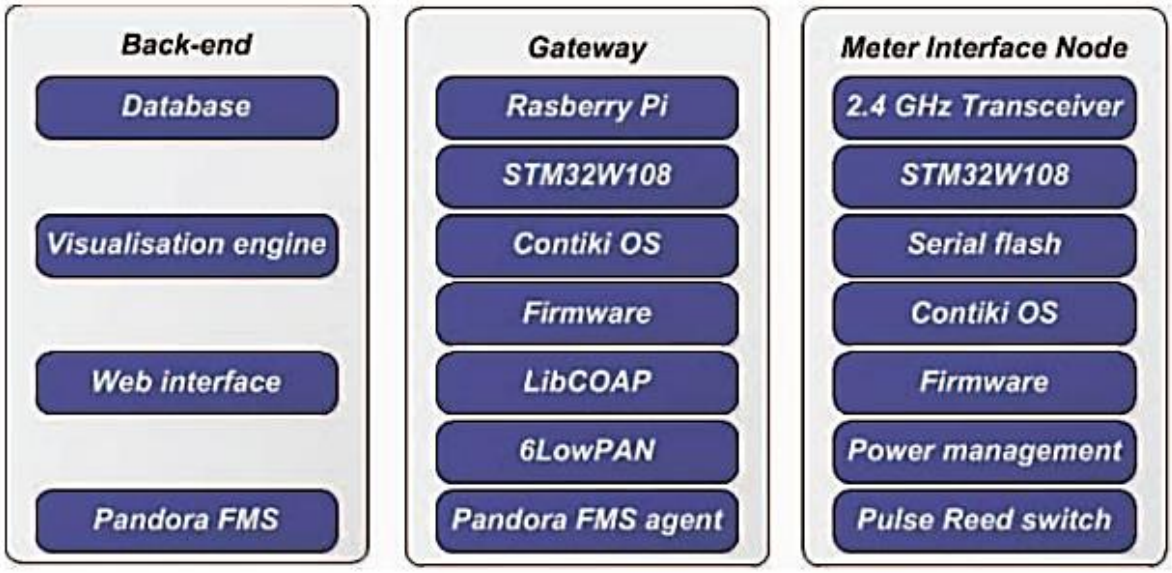

Figure 1: Illustrate the hardware or software architecture for systems [Google].

2. LITERATURE REVIEW

Damien P studied the possibility of simplified company administration or pricing based on time of usage, as opposed to the genuine danger of customer privacy breaches, which necessitates further involvement, as well as discussion from all parties on these three elements of the use of smart metering devices, was addressed in a suggested paper [9]. Rachelle Willis et al. studied the importance of retail metering in urban water management. demonstrating the possible significance of smart metering in the future of water planning A Web-Based Information Management System is presented, which incorporates smart metering, information management systems, and wireless communication networks, to convey data from smart meters to residents regarding water consumption. Customers can view this information online

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[10]. Cara D. Beal et al. studied smart metering techniques. This study demonstrates that households' views of their water consumption were frequently misaligned with their actual water usage. This study looked at the contribution of end users to overall water usage for each category of Dzlowdz, Dzmediumdz, and Dzhighdz water consumers. Consumers received the information depending on their water bill [11].

3. DISCUSSION

The recommended smart water meter might eliminate the majority of problems with the present meters. There is still an opportunity for future upscaling or enhancements even though the indicated meter's efficacy has not yet been attained. Instead of installing a single meter per house, provisions can be made to allow individual water monitoring consumption in each area, such as the bathroom, kitchen, etc. Thus, each person's water consumption may be observed and managed. The additional infrastructure might all be automated further and more precisely. By carefully monitoring the water consumption in several rooms of the same home, it is feasible to identify any leaks. If there are leaks or thefts, they can all be instantly identified and fixed. More consumer-friendly services, including online bill payment, might well be made available by linking the Adhaar number that is already present in the Water Board's database.

Using free source software, a meter interface node was created. Because of this, the user is allowed to change the source code to meet their own or the demands of the service provider. The created system gives the customer a real-time water usage monitoring system, but it may also be utilized for additional services like leak localization and detection. The system offers 100m of short-range communication, but because it supports mesh network design, the coverage area would grow if additional houses choose the same system. Tools for visualizing data are open-source, which reduces the cost of their development and integration. Additionally, a web-based interface is created to display historical or real-time water use. Additionally, monitoring systems can help users change their water use, reducing their water consumption, but can also help identify and address abnormal water consumption.

4. CONCLUSION

The Smart water meter is automated and doesn't need a lot of human intervention, which lowers mistakes. The meter promptly shuts off to prevent tampering and notifies the Water Board of the sort of issue. In addition to the previously mentioned changes, a new system that would impose slabs depending on the volume of water provided as opposed to the current system's tariff-based approach is also included. The Smart Water Meter is implemented in two different ways, each utilizing a Raspberry Pi and PIC microcontroller. Water usage information and limit status are supplied to the control station through text messages (SMS) using a PIC microcontroller, and that data is then uploaded inside the local database or shown in the front end (GUI). Wi-Fi is used by people in the Raspberry Pi implementation to send information about water consumption to the cloud. It comes from the cloud and is uploaded into the database. The limit-based slab system assists in controlling water distribution. The current meter does not have this clause. This paper's major goal is to learn more about the benefits of smart wireless water meters. This paper will inform readers about smart wireless water meters in the future.

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