Smart Water Meter Solution

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Introduction

Large volumes of water from the main source or the reservoirs is channelized and distributed in domestic water supply networks to cities and towns. The activity has been labour intensive and requires meticulous attention of the administration taking care of the supply operations.

Issues addressed by proposed systems are:

➢ Labour: Considerable reduction in size (Automation of supply monitoring, metering & billing).

➢ Lack of transparency on consumption and metering (Remote delivery of metered data).

➢ Accountability of total water supplied and the sum of total water consumed of customers.

Methodology

IoT Enabled water meter uses sensors which monitors leakage and flow rate. There is no need of labour who reads the meter which minimizes the risk of complaints related to errors in meter reading. Customer can keep track of water consumption 24/7 via mobile and web applications. It enables flexible reading schedules, eliminating delays in summary billing of commercial accounts. It increases information about usage and empowers them to conserve resources and saves money.

Monitoring the leakage helps the water management department to reduce loss of revenue. This meter delivers more accurate billing. It provides solutions ranging from addressing apparent losses with meter accuracy with tactics such as pressure management. It improves revenue of the department. It eliminates bills based on estimated usage. It detects unlawful actions, such as theft, meter tampering and conversation violations.

Key Findings -1

➢ **Our Deep Insights.**

As every business today is focusing to succeed on true R.O.I.—Return on Intelligence—one must have the right data at correct time so that right and intelligent decisions can be made and continue to optimize the smart water system as needed to different domain verticals.

Smart water is more than measuring the flow from storage to consumption. It's more than remote meter reads. It's time to consider smart water as spanning every part of the water cycle—from sourcing to treatment to delivery to consumption to reclamation. At the foundation of a smart water cycle is reliable and robust data delivered through a smart utility network.
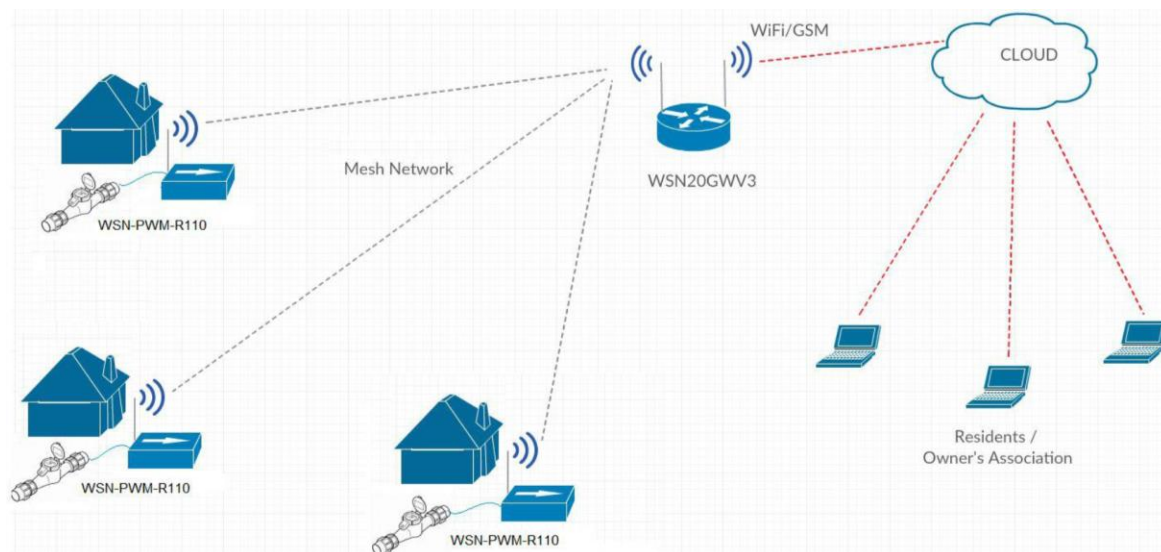

In the above diagram it consists of water meter which has sensors and routers which are connected to a gateway wirelessly. This gateway is connected to a cloud where all the data is sent to the cloud and in the database all the results are stored for further computation and analytics. Each house s data can be accessed by the residents or water department.
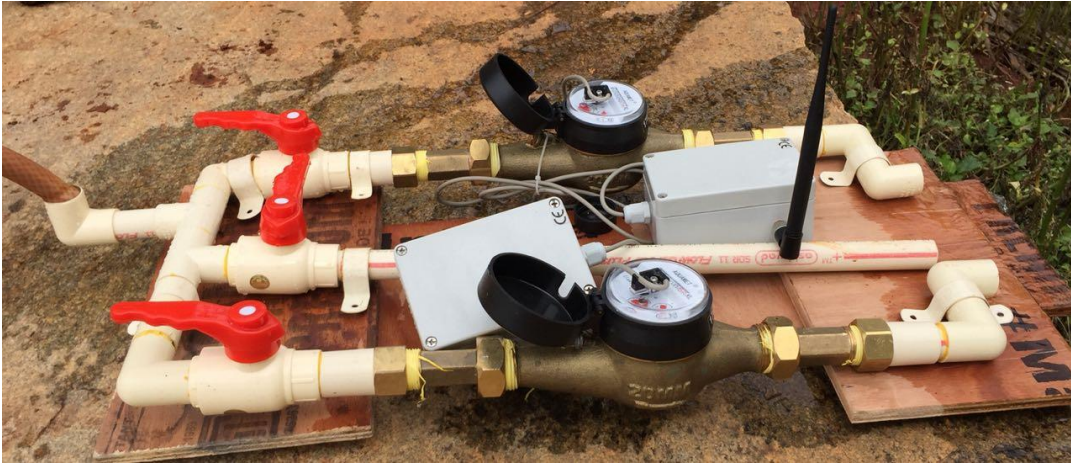
Snapshot 1: Side view of watermeters with sensors, valve connected.

In snapshot 1, shows us the side view of water-meters which consist of a valve which controls the flow of water to the meter. Water meter has a transmitter which send the data to the gateway which is captured by sensors.

Valve 1 Outlet

Valve 2 Outlet

Leakage Valve as simulator for Demo purpose
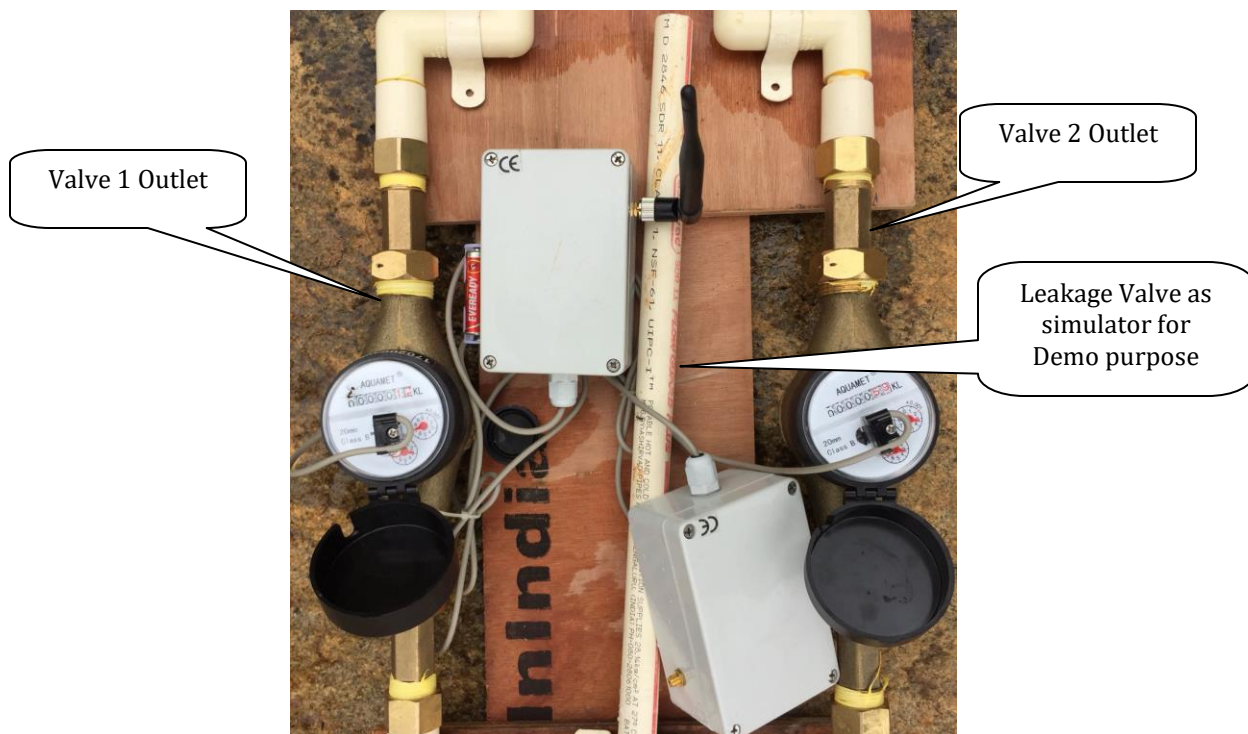
Snapshot 2: Front view of watermeters with sensors, valve connected.

In above snapshot 2, shows us the front view of water-meters that transmitter and the sensors are connected to the water meters. Transmitter works with batteries.

Key Findings -2

➢ **Water Meter and its Flow.**

A water meter is a device used to measure the volume of water usage. There are several types of water meter in common use. Selection is based on

- different flow measurement methods,
- the type of end user, [House hold or commercial]
- the required flow rates, and
- accuracy requirements.

Measuring water consumption today is done mainly with velocity water meter.

A velocity-type meter measures the velocity of flow through a meter of calibrated volume. The speed of the flow can then be converted into volume of flow for usage. There are several types of meters that measure water flow velocity to determine totality usage.

The work is aimed at domestic water quality monitoring. The sensors are assumed to be connected to water-meters at water inlets to dwellings. The controller and the sensors form a single module installed in the user premises. The sensors are directly connected to controller. For applications such as lake, river and sea water monitoring, sensors and the controller are separated by considerable distance. Water meters are indirect volumetric totalizers in which the flow stream causes a vane rotor to revolve. The number of rotor revolutions is proportional to the total flow and the frequency of the revolutions to the flowrate. The various designs are differentiated by the direction of the inflow and by the method utilized to measure the signal. The flow entry is tangential and causes the wheel to revolve in the rotary vane meter. A gear train is utilized to transmit the rotations of the wheel axle to the totalizer which, in wetted designs, is located in the fluid.

Seals separate the indicator area from the measurement area and transmit the rotation over a magnetic coupling. Rotary meters are used as domestic water meters, and are also used in hot water systems as the volume metering element for smaller heat quantity totalizer.

Key Findings -3

> ## Measure and Monitor Smarter

Life9sys advanced smart metering technology including residential smart water meters and our industry-leading commercial and industrial water meters are trusted and well proven to capture more revenue, detect customer leaks and deliver more accurate billing. With our continuous innovation in advanced measurement and monitoring technologies, we enable you to measure pressure, temperature, level, flow, status and more across the water cycle networks.

The 'Admin' manages the wastage and usage of water; the bill payment info and the locations (snapshot 3). The Flow rate usage records are shown below as per Hourly (Snapshot 4) and Monthly (Snapshot 5) usage.
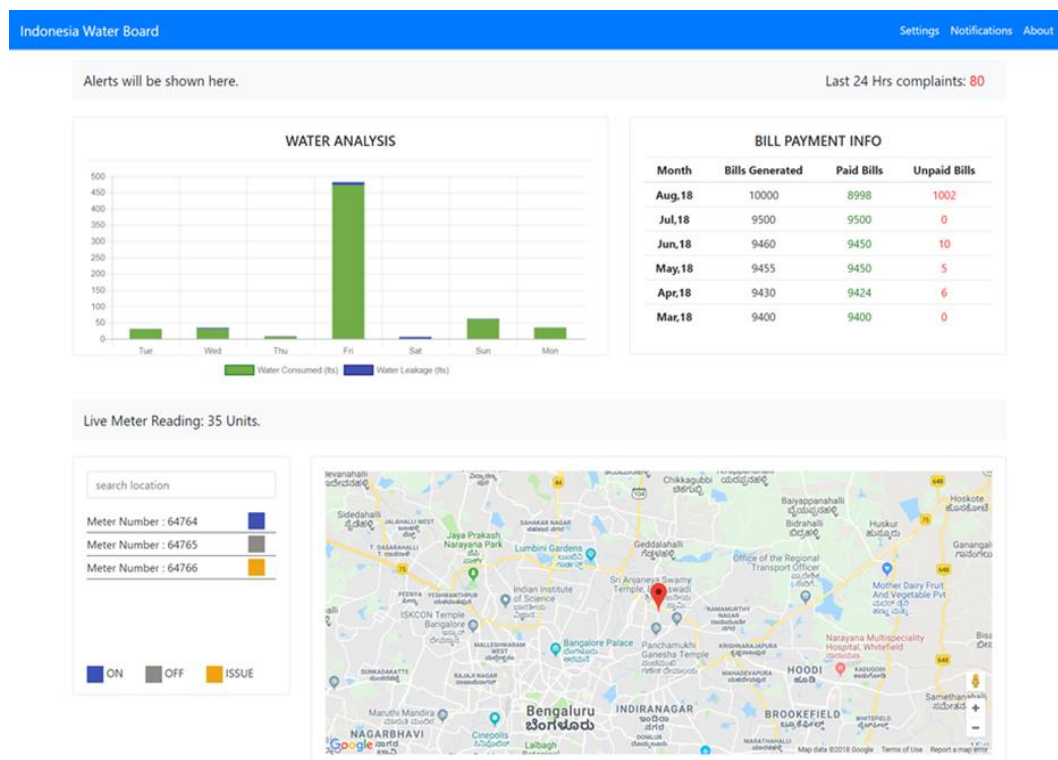
Snapshot 3: Dashboard for Admin
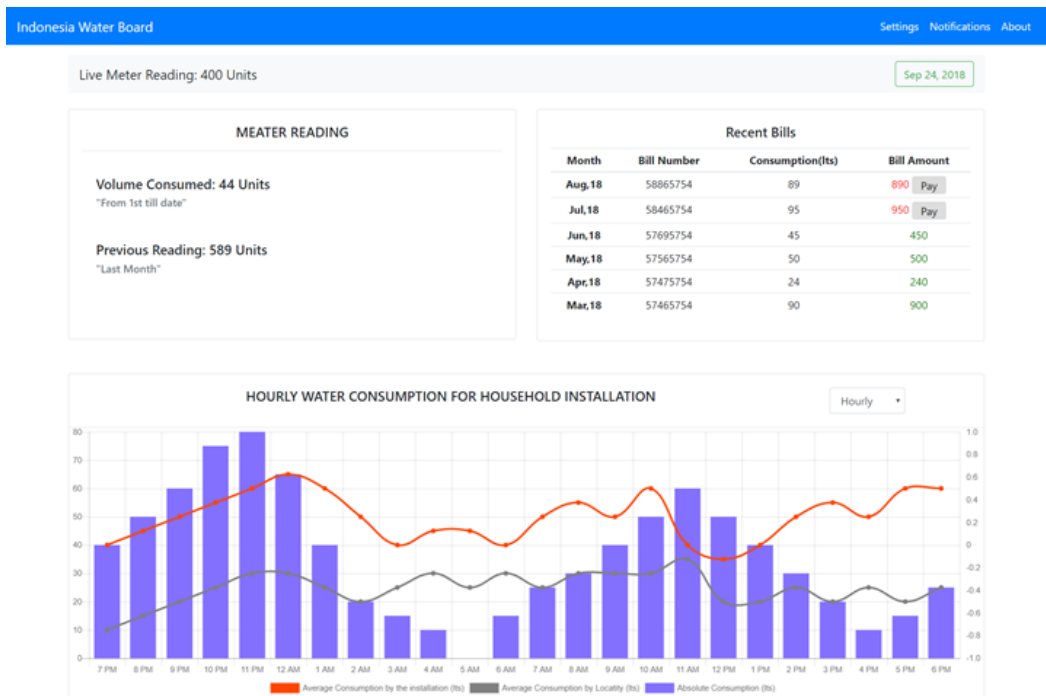
Snapshot 4: Dashboard for Users (Hourly Report)

Snapshot 5: Dashboard for Users (Monthly Report)

Our Smart Water Meter Enables

- ✓ Smart Measurement

- ✓ Better and Easy Communications

- ✓ Increased Revenue

- ✓ Increased Efficiency

Overall Summary

- Wireless communication enabled IoT water-meters to be installed at each customer premises

- IoT enabled wireless communication gateways to be installed in appropriate locations of the cities/towns/villages to be included in the smart utility services

- AWS/Azure is chosen as the cloud platform to implement centralized data processing and analytics using.

- MQTT is the chosen IoT protocol for communication of data gathered from the metering system to the cloud and vice verse.

- The meters shall be read remotely in 12 hour intervals [Programmable] or depending upon the customer frequency.

- The meters will broadcast alert messages like meter tampering, excess flow, etc.,.

- Graphic user interfaces, dashboards and mobile applications is created to help the utility service companies, monitor the water supply system in real-time.

CONCLUSION

IoT enabled water meter presents a low cost IoT based solution using LPRF/UBW/ LoRa/Sigfox for monitoring and control of water distribution network. Thesenodes show good coverage, energy efficiency and reliability while reducing deployment and maintenance costs and can be easily modified to add pressure and flow sensor readings. GSM is used as a redundant system to ensure continuous monitoring and control. Initial deployment results are encouraging and all remaining OHSR, UGSR and manual valves will be instrumented to create a smart water distribution network.

The solution also provides how end users can access their water meter data by simply accessing a Smartphone App which is integrated with our platform. With this App, the end user is able to see their water consumption on a daily, weekly, or monthly basis and forecast their monthly bill. Other features have been implemented to educate the end user and provide incentives related to water conservation and cost savings. By building this IoT enabled water meter we aim to implement smartnesss which will provide high data analyzing capability at lower cost. This system will not only provide significant industrial benefits but also many social benefits in terms of ecological sustainability.

Thank You

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