**Smart Billing System For Water Suppliers**

**Introduction**

In recent times, development in computing and consumer electronics technologies have triggered Internet of Things (IoT) paradigm. Internet of Things (IoT) is described as enabler that links seamless objects surrounding the environment and performs some sort of message exchange among them. The Internet of Things (IoT) is a collection of objects that work jointly in order to serve consumer tasks in a federated manner. It binds computational power to deliver data about the surrounding environments.

In current water billing system, each building consists of one analog water meter and the total bill amount is equally divided to each home in that building, irrespective of what amount of water that home has consumed, our system is cost effective enough to be installed in every household, floors. And also many of the watering Systems used in the process are analog (mechanical) and digital meter both meters however don’t give the facility to read out the values and communicate it timely to the user, allowing the user to monitor the usage on a daily basis and therefore helps in future planning of water usage and thus helps in water conservation measures.

At present user has to wait till the end of the month to know his water usage and the water bill usage detailed is the total amount, the daily usage data virtually can’t be accessed by the user. And apart from that the delivery of the water bill is bogged by delay as person from water has to come and provide the bill.

Our project aims to eliminate all the said issues, by giving user Timely Notification and SMS to the user’s mobile, the water usage on a daily basis can be accessed through free cloud platform, and the total amount of water. The target cost being around 2000 INR seems to be expensive compared to mechanical water meters that are presently being used but since this being a onetime cost it will definitely become a money saver for the consumer as he would have to pay only for what he uses. With meters being placed open to outside environment, mechanical water meters are prone to corrosion as they are made of metal. With more electronics and less mechanical hardware, system can be made less prone to environmental changes as they have large range of working conditions.

Consumed at end of the month is sent through SMS. Also an android app is built to act as a user interface to above said features. A controller board based on the ATmega328P was deployed for the prototype design. The board consist of 14 digital I/O pins (of which 6 was used as PWM outputs), in addition with 6 analog inputs, a USB connection, and a power input source.

**Existing System**

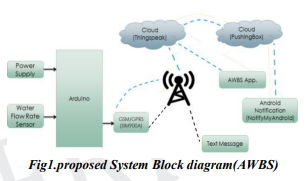
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**Proposed System**

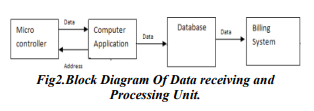
The prototype for the flow conservation is to measure inflow and outflow of water. Water supplied from water distribution Authority is stored in ground level reservoirs and overhead tanks and is further distributed to rest of the consumers. This project installs flow measurement sensors at the input and then measure water volume in the water reservoirs. The volume of water inside the reservoir would give the accumulated difference between inflow and outflow of water. Hence, then the outflow can be calculated.

**System Design**

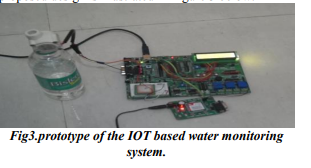
The scheme involves the use of a variety of innovative features. Firstly, the use of High Density Polyethylene pipes that requires fewer joints makes for a more durable system as well as reduces the loss of water through leakages. Secondly ,the use of Automatic Meter Reading system has led to effective water auditing possible at any point of time and with cent per cent accuracy.



This AWBS consists of a digital water flow rate sensor which is used to calculate amount of water consumed more accurately than the prevailing analog meters. Based on the amount of water consumed, bill is generated at the end of every month and an SMS is sent to the registered mobile number of the consumer. At the same time, this bill details are updated on the Water Board Server (Thingspeak Server) in our case), thus preventing delays in the process. Along with an SMS, notification through an APP and notification through an e-mail is also sent to the consumer. An APP is made available to the consumer where he can daily monitor the amount of water he has used and also access the online bill payment portal. Fig2.Block Diagram Of Data receiving and Processing Unit.



In this project, Arduino UNO with an on board ATMEGA328P Microcontroller is used. The board has 14 input/output ports. 5V, 0.5A USB power supply powers the Board and a 12v, 2A Power Supply powers the GSM Module SIM900A. The Water Flow Rate Sensor used here is based on the working Principle of Hall Effect .The sensor we use here is YFS201 water flow rate sensor. GSM/GPRS module acts as interface for Arduino board to send an SMS as well as connect to the internet. Pin 2 of the Arduino Board is configured to act as an input, it receives the interrupt from the Water Flow Rate Sensor Thingspeak and Pushingbox are the cloud servers’ act as server for board and platform to send a Push Notification respectively.

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**Experimental Results**

Data from Flow Rate Sensor : The Falling edges on the Signal Pin of the Flow Rate Sensor are input to pin 2 of Arduino board, which is configured to handle interrupts. 4.5 pulses are generated in one sec if the Flow Rate is 1l/min. The computation Logic, uses a calibration factor to Convert the Pulses count into Flow Rate i.e. L/min. The computation of Flow Rate is done for each day. The data for each day is uploaded onto the Thing Speak Server .After 30days, bill is sent as an SMS and a Push notification through Pushing Box. ThingSpeak is an open-source IOT cloud platform to store and retrieve data using HTTPotocol over internet. Pushing Box is a cloud that can send notifications based on API calls. From one request, you can send several notifications like a Push Notification, a Tweet, an Email, etc. The data for each day is uploaded onto the Thing Speak Server .After 30days, bill is sent as an SMS and a Push notification through Pushing Box.

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