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IoT Based Automated Wate Billing System (AWBS)

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Abstract :- **— The purpose of this project is to present a product designed to assist with urban home water billing system in India. The project integrates a water flow rate sensor, designed to create a carefree solution to urban water metering and monitoring of the water usage using cloud, mobile communications and mobile application. Arduino, a rapid prototyping ATMEGA328Pbased microcontroller based platform is used to develop a prototype which measures the water flow rate through the household pipes and sends an SMS at the end of every month .In addition to that, detailed water usage with charts and graphs can be obtained from a cloud platform called "thingspeak" and another cloud platform called pushing box sends a notification to the user's mobile. A mobile app is also designed to serve as a user interface helping to access the cloud and paying the bill through Bengaluru One Website.**

Keywords: **- Arduino, data analytics, GSM900A, YF-S201**

I. 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.

II. LITERATURE SURVEY

This model has designed and implemented wireless sensor network for measuring utilities such as electricity, water. Because of disadvantages of traditional meter reading such as errors in reading,

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inaccuracy, external conditions affecting readings, delayed work we have implemented meter reading system based on IOT technology. This system performs tasks such as taking meter reading, distribution of bills, sending notice.

An automatic remote meter reading system based on GSM is presented in this paper. This paper is useful to obtain meter reading when desired so meter readers don't need to visit each customer for the consumed data collection and to distribute the bill slips. Microcontroller can be used to monitor and record the meter readings. In case of a customer defaulter, no need to send a person of utility to cut off the customer connection. Utility can cut off and reconnect the customer connection by short message service (SMS). Furthermore, the customer can check the status of consumption just by sending a simple SMS request. In this system energy meter readings are being transferred by making use of GSM.Water utility customers also have an important role in leakage control. It essential that this resource can be captured not only because it is an increasing scarce supply but also because of its embedded energy and the greenhouse gas footprint it represents. Although in many parts of the country water might be considered the cheapest utility commodity, water loss is still very costly to customers and water utilities.

III. UNITS SYSTEM ANALYSIS

Existing System

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.

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.

IV. 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.

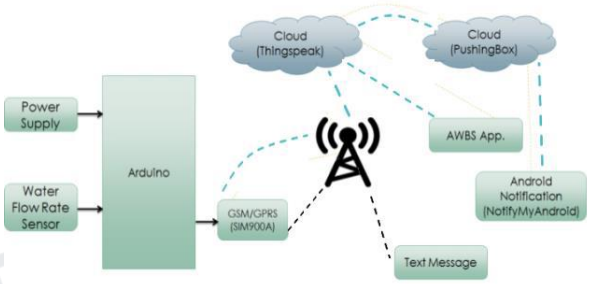

Fig1.proposed System Block diagram(AWBS)

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.

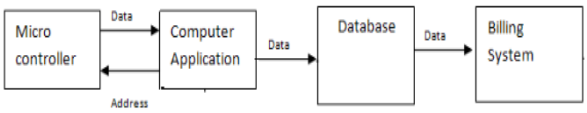

Fig2.Block Diagram Of Data receiving and Processing Unit.

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 YF-S201 water flow rate sensor. GSM/GPRS module acts

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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 The system implementation of the proposed design is illustrated in Figure 3 below:

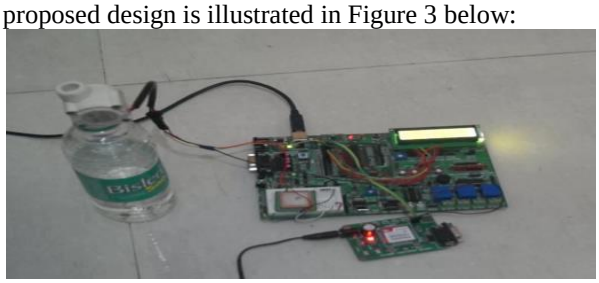

Fig3.prototype of the IOT based water monitoring system.

V. 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.

Fig4.SMS Received from consumer

Fig5.Graph Displaying water consumed

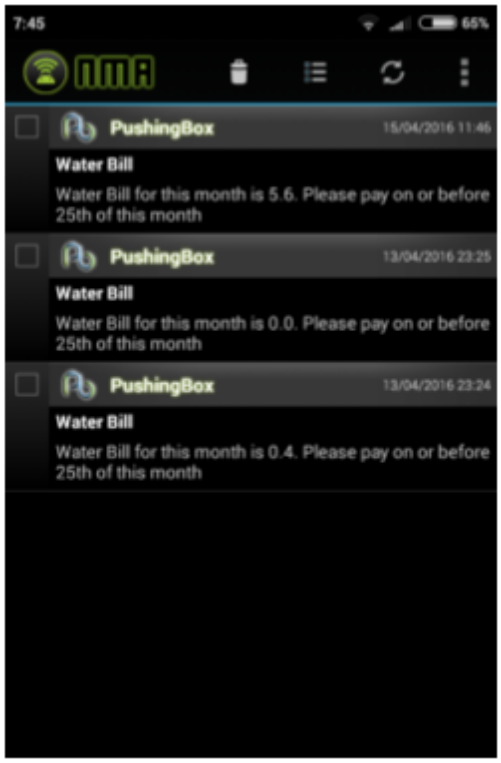

Fig6.Pushig Box Notification for the consumer

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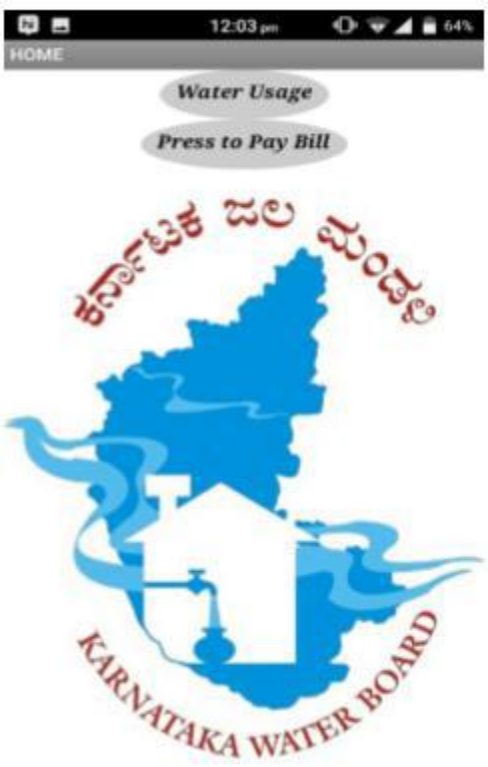

Fig7.Android AWBS Application

Fig7.bangalore One bill payment application

CONCLUSION AND FUTURE ENHANCEMENT

As discussed in this paper, AWBS plays an increasingly important role in water conservation. Thus, adopting water
Conservation methods and technologies that support water preservation and management is an area of increased priority.

By investing in such technologies and systems now, communities can significantly reduce consumption and ease the strain on our nation's water supplies.

The paper describes the design and working of Smart Energy Meter and represents how Smart Energy Meter can be used for Automatic Meter Reading. It is the most economical implementation to develop mankind in this era of technology.

Detecting leaks helps saving water resources, cost and energy. More water is available to consumers and can be billed. Water

Recontamination after centralized treatment is less likely to happen in the pipes.

With the present enhancement in the use of technology to facilitate mankind, it is an efficient and practical utilization of present networks. The leakage control can be enhanced by incorporating sensors at the line connecting each and every house to detect the leakage. Provisions can be provided to the customers to send an alert message to the authority in case of any faults or damage occurs to the meter or the pipe can be reported to the utility providers by sending an alert message which will stop the water connection to that particular house.

REFERENCES

[1] Implementation of Automatic Meter Reading System Using Wireless Sensor NetworkVolume 2, Issue 12, December 2013

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International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Volume 4, Issue 4, April 2017

[2] Automatic electric meter reading system: a cost-feasible alternative approach in meter reading for Bangladesh perspective using low-cost digital wattmeter and wimax technology Tanvir ahmed1, Md Suzan miah2, Md. Manirul islam3 and Md. Rakib uddin4.
[3] Babak Aghaei, Using Wireless Sensor Network in Water, Electricity and Gas industry, 978--42448679-3/11/$26.00 ©2011 IEEE [2] Design of remote automatic meter reading system based on ZigBee and GPRS,by Li Quan Xi1, Li Gang2, ISBN 978-952-572610-Proceedings of the Third International Symposium on Computer Science and Computational Technology(ISCSCT '10)Ji, P. R. China,14-15,August 2010, pp. 186-189.
[4] Aditi Dayal, Researcher's "Ensuring Efficient Water Supply" report on Malkapur's 24*7 water supply system, One World Foundation India.