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Design and Implementation of Automatic Water Distribution System with Pre-paid & Post-paid Facility

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***Abstract* — Municipal Corporation Water Distribution System is manual and has no system to monitor the consumption of water. Each individual have their own capacity for usage of water but everyone have to pay same amount for their consumption. And if any person fails to pay water bill then there is no such system which can restrict the water supply to their houses. According to study, there is a case where one family gets water supply for 1 hr/day and another family gets 24 hours water supply. There is no system that can monitor the flow of water and consumption of water. The "Prepaid and Post-paid Water Distribution Controller" been developed to override the problems prevailing in the existing manual system. This system is designed for the municipal corporations to carry out drinking water operation in smooth and effective manner. Water Distribution Controller is the system which can control the usage of water according to the bill payment by the user.**

Index terms:- *Water supply system, IOT, water level sensor, flow sensor, solenoid valve, GSM 800.*

I. INTRODUCTION

Cost recovery is a key element for sustainable water supply. Currently most water service providers are experiencing problems with cost recovery from community water supply schemes. Many schemes introducing prepayment systems or other innovative ways of cost recovery. Prepayment water metering systems are already available in India although historic and practical performance reports in a 'real' environment are in many cases still lacking. Although proposed system is by no means the final word on this subject, it predicts that both water service providers and their customer are likely to welcome these systems as cost effective and user friendly.

The report also explains how water payment and administrative support systems can be selected and introduced in a manner which promotes effective cost recovery. Metering, prepayment, and the accompanying systems should never be viewed as technical solutions to the problem but instead a holistic approach should always be adopted. For this reason proposed system address a whole range of options and not a single system. Secondly the costs of 'cost recovery, and especially the administration costs, are also included as this must be taken into account for affordability and sustainability.

II. PROPOESD METHODOLOGY

1. Proposed Model

In this system we have two modes of water distribution the prepaid system and the postpaid system. First user will send the message to get water supply.

The user will send message according to its need, after that the system will distributed the water as per user requirement and save data to cloud.

The user will check the water readings on website.

In this system solenoid valve and flow sensor are connected to microcontroller. Also control board is present to check the usage of water distribution.

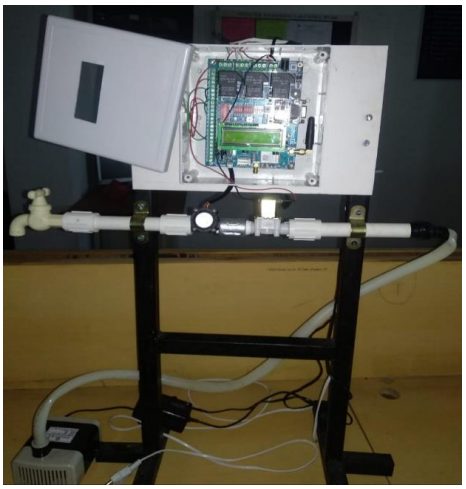

Fig1: Overall View of System

2. IMPLEMENTATION

1. Hardware Module
2. Software Module
3. Web Server Module

1. Hardware Module

It consist of hardware parts like flow sensor, solenoid valve, and microcontroller for controlling the flow of water.

Flow Sensor: Water flow sensor consist a plastic valve body, a water router, and a hall-effect sensor. When water flows through the router, rotor rolls. Its speed changes with different rate of flow. The Hall-effect sensor outputs the corresponding pulse signal.

Solenoid Valve: A solenoid valve is an electro-mechanical device in which the solenoid uses a electronic current to generate a magnetic field and thereby operate a mechanism which regulates the opening of fluid flow in a valve.

4-Digit 7-Segment Display: To display real time meter reading. Seven segment display consist of seven LED called segments arranging shape of 8 most seven segment display actually have 8 segment, with dot on right side of the digit that serves as decimal point.

SIM800 Module: GSM+GPRS supportable module to use GSM and GPRS functionality in project. SIM 800 module is a quad-band GSM or GPRS module design for global market. It works on Frequencies GSM 850 MHz, GSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz.

2. Software Module:

In software modules the coding is takes place throughout Arduino Uno genuine. With the use of this coding the data synchronization towards the whole system is being maintained and stored properly onto cloud.

Arduino Uno: Arduino uno is a microcontroller board based on at Mega328. It has 20 digital input output pins of which six can be used as an analog input and six can be used as a PWM output. A 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and reset button.

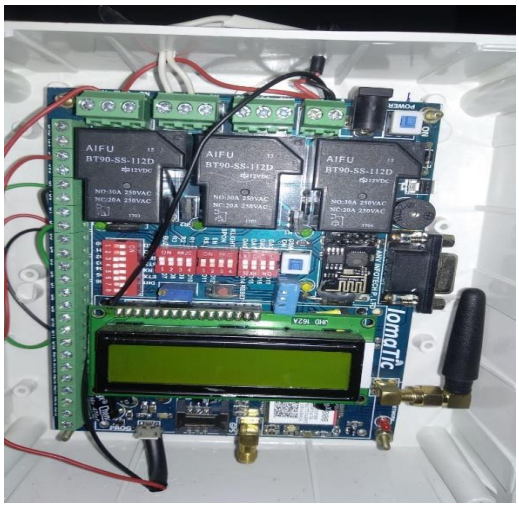

Fig2: Arduino Uno board

3. Web Server Module:

It consists of server parts like web server, data base, and web app to fetch and store the reading of meter. Server will fetch the real time ratings and display the same on web site/application in form of records or charts.

IOT: The internet of things (IOT) is the extension of internet connectivity into physical devices and everyday objects. Embedded with electronics, internet connectivity, and other forms of hardware, these devices can communicate and interact with others over the internet, and they can be remotely monitored and controlled.

The definition of the internet of things has evolved due to convergence of multiple technologies, real-time

analytics, machine learning, commonly sensors, and embedded systems.

Traditional fields of embedded systems, wireless sensor networks, control systems, automation and other all contribute to enabling the internet of things.

III. RESULT

A. Sending a message to system

In this system if user want to get water supply then user will send the message to the system. If the user want 1ltr of water supply then he want to send a message “SET 1”. & if user want 2ltr water then he will send message “SET 2”.

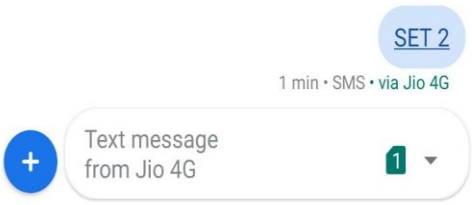

Fig 3: Sending a message to system

B. System accept the message & On the supply of water

The system receive the message for the water supply and according to user need the system will distribute the water. The solenoid valve and flow sensor in this system control & measure the water supply.

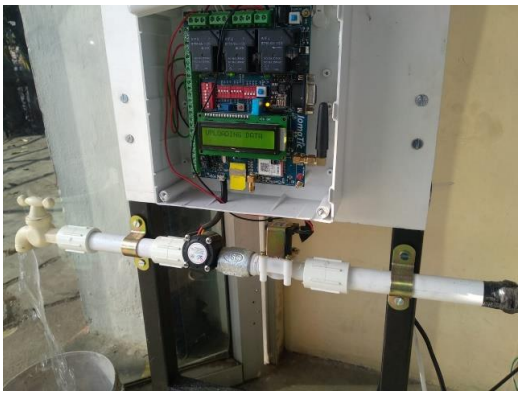

Fig 4: Water Supply STARTS

C. Counting Water Supply

When the system is on and flow sensor will sense the water supply. User would send the message according to his need what amount of water he will be needed. He would the send message SCT 1 its meaning is that he will needed the 1 ltr. Water from the meter. And user should check the control meter and checks the how much amount of water.

As its needs control board should check the meter reading and user should observe according to its needs.

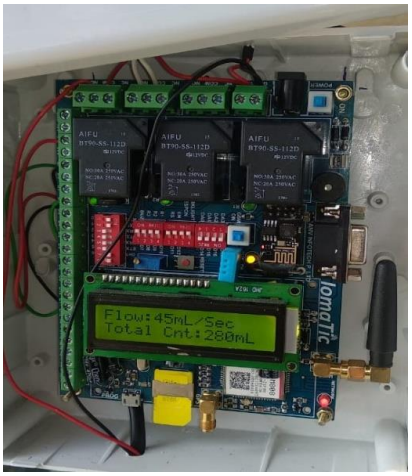

Fig 5: Water Supply Counting Display

D. Uploading Data

When the system is on and water supply will be gone the meter reading will be done along with user need. And the data should be uploaded on cloud. If user should want 1ltr of water that time clod should accept that message of 1ltr amount of water would be send along with that user recharge 1ltr water should be minimized.

The main work should be done when the data is being uploaded to cloud and when the supply of water is being done.

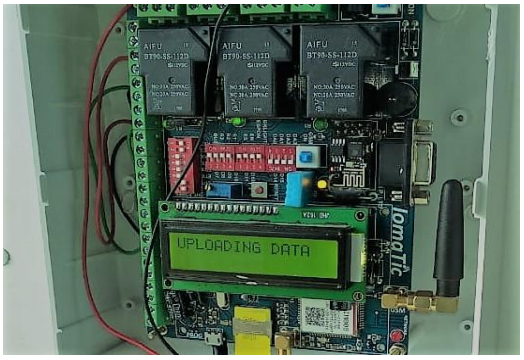

Fig 6: Data Uploading Display

E. Lastly Connection will be off & stop the water supply

After user get the water supply then system will be automatically stopped and the readings of water distribution are automatically saved to the cloud.

IV. Conclusion and Future Scope

Using the system as framework, the system can be expanded to include various other option which cloud include security feature like capturing the photo of a person moving around the location and storing it into the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and implemented in the hospitals for disable people stores it. The system can be expanded for energy monitoring, or weather stations. This kind of a system will respective changes can be or industries where human invasion is impossible or dangerous, and it can also be implemented for environmental monitoring

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