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Water Management Resources

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Abstract: *Smart City based IoT water meter is a device that measures the amount of corporation water used by house or apartments. Water management problem appears in apartments. A shared meter is a common problem for the payment collection in the apartment. In this paper we proposed the solution to this problem in which a device is used to calculate the flow rate and quantity of water consumed by the householders and we can monitor the water consumption from each user and we can set the limit to each user.*

Keywords: *nodemcu, arduino, water meter, IoT*

I. Introduction

IoT enable the devices that can communicate via internet and WAN network with each other in the form of data monitoring. IoT based water consumption monitoring is an internet based device that measures the amount of water consumption in an apartment per home. Now a day, water conservation is big issue in many apartments. Apartment association should take initiative to send the message of the amount of water consumed to all residents. The proposed solution for this issue by installing the water monitoring system for every individual apartment or house to monitor the consumption of water per day basis. Another problem is where a common meter is fitted in complex and bill for cumulative consumption amount is to be shared among the households, where they are being charged more than what is to be paid. So they need a system under which charges are levied as per consumption of each family instead of total cumulative consumption. Smart meter for water utilization provides solution for this problem and it measures the quantity of water consumed by each household and allow the user to monitor the consumption level. While installing this smart water meter we should avoid above issues and we should keep track on the water consumed over the internet. The supply of water can be ended if the residents are not present in their home and it reduces energy consumption directly or indirectly.

II. Literature review

Arduino is utilized to control the solenoid valve using flow sensor. The purchase of water should be possible by utilizing programming in which the requisite of water can be set and utilised. To connect Arduino board with the internet the Arduino Ethernet Shield is used. It uses the Wiz net W5100 Ethernet chip. The IC gives a system stack fit for dealing with internet protocols both TCP and UDP packets. The proposed design monitor of the issue of over consumption, over utilization, acquiring of water and makes an appropriate distribution [1]

Solution to this issue in which a device is used to calculate the flow rate and quantity of water consumed by the householders and send it to the cloud to monitor the consumption of water [2]

The flow rate of the water is measured by flow sensor that works on Hall effect principle. Raspberry Pi a micro-computer receives the data from Arduino microcontroller which is connected to the flow meter. The web based solution also depicts the day to day consumption of water to its users and water distributors. The paper also aims at predicting the consumption of water in the future for its users using advanced data analytics.

This paper also includes demand management, asset management, and leakage management aspects of water management system [3]

Design of a low cost system for real time monitoring of the water quality and quantity of water in IOT (internet of things). The system having of several sensors are used to measure physical of the water. The parameters flow sensor of the water can be measured. The measured values from the sensors can be processed by the controller. The Arduino model can be used as a controller. Finally, the sensor data can be shown on the internet using WI-FI system. A cloud server was configured as data saving and analysis. This data can be used in future research and development. [4]

III. Proposed Methodology

The system is installed on the apartment individual Flat/House. The apartment upper tank and lower tank is connected to the level sensor with NodeMCU to control the level of upper water tank. The Flow sensor Node mcu is connected to each pipeline of the apartment to monitor the consumption daily. If the consumption is more than 1000 liter then the solenoid valve will off and water flow will off. Then after 24Hrs the valve will reopen.

In this project we proposed the solution for water utilization using water flow sensor and interface with Node MCU microcontroller which embedded with Arduino code. Arduino software is used for Arduino coding to find flow rate of water, display the output in serial monitor and send the sensed data to the cloud which can be monitored by customers.

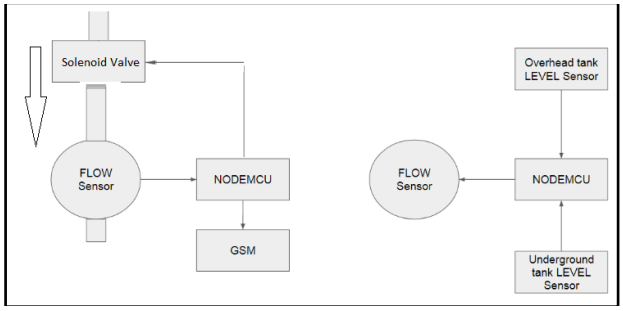

Fig. 1. System Block Diagram

A. The System Hardware

NodeMCU :- Wifi 2.4GHz ESP 12 Microcontroller with 9 Digital IO pin and 1 analog pin. Easy to program with Arduino IDE. It can be programmed as per the requirement like server or client. In this project we are implementing the program of nodemcu as a server. When it is connected to the hotspot access point it get the IP address of the network. This IP address when we put in the web browser we get the control panel buttons to control it.

The range of wireless depends upon the range of wifi access point or hotspot.

Fig. 2 Node MCU 2.4GHz ESP 12

Flow sensor is used to measure the rate of flow of water through and sends the switching signal to controller at Interrupt pin. This sensor consists of a plastic valve body, a rotor and a Hall Effect sensor. The wheel rotor rotates when water flows through it and its speed is directly proportional to the flow rate per min.

Fig 3 Flow rate sensor

GSM module use to send sms to the consumer for the quantity alert sms and Power supply to run the system

B. Software and Programming

Software use : Cloud server for data storage and online monitoring, Arduino IDE for NodeMCU programming Arduino IDE is used to program the NideMCU. The logic of the system is to set the water limit say 1000 liter per day. When the consumer utilises 500 liter of the water then sms will send to him that 50% water used today. then for 90% water utilises sms will send and then the solenoid valve close the water supply for his apartment and sms will send that the water supply is closed due to 100% usage and will start the next day. We will try to set the timer like after 12AM the solenoid valve will turn on so water will start again.

IV. Conclusion

As per the study of the literatures we are designing and implementing the digital water meter for an apartment. Here we will try to implement the system to be work on wifi network, for this we are using mobile hotspot. Also the system will monitor the water consumption data online w.r.t time.

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