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Automatic Water Distribution System over Iot

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Abstract- *In this paper presented we have described automation of water distribution system for a city over internet of things via embedded device that will be responsible for the communication of the water meter with the server that will channel the water supply.This mode will enable the water supply agencies to channel the flow of water and charge each customer according to their water usage This system is designed with low cost and expanded to control vaiety of devices.*
Keywords: *IOT- internet of things, MS SQLServer Database,MS Visual Studio, (ASP.NET)Arduino IDE, Android Studio.*

I. Introduction

Overview

According to recent survey, water has become a big issue because of less rain fall, increase in population many cities are facing this problem people have to suffer from this problem they don't have sufficient amount for their daily needs. Due to lack of monitoring water can't be supplied properly, some areas in city get water while other some areas can't so, there is a need of continuous monitoring, water supply scheduling and proper distribution another problems are excessive consumption, overflow of tanks, leakage in pipeline, interrupted water supply. Water is a basic need of every human being everyone has to save the water many times with lack of monitoring, overflow of these overhead tanks can occur because of this lots of water get wasted, another thing because of overflow in the pipelines with more pressure there is possibility of pipeline damage, leakage detection is one more problem all these problems are because of lack of monitoring, manual work, less man power over Internet of things (IOT) platform. Confident about their work and takes a jump to start the paper writing. Internet of things is nothing but the network of physical objects eembedded with electronics, sensors, software, and network connectivity. Monitoring can be done from anywhere as central office. Using Ad fruit as free server data continuously pushed on cloud so we can see data in real time operation. Using different sensors with controller and raspberry pi as Mini Computer can monitor data and also control operation from cloud with efficient client server communication.

II. Analysis Of System

Problem Definition: Municipal Corporation Water Distribution System is manual system and have 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 not any 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./2 days and another family gets 24 hours water supply. There is no system that can monitor the flow of water and consumption of water.

Proposed Solution:

Prepaid and Post-paid Water Distribution Controller will monitor the flow and consumption of water by each family. The system will get planted on the water supply pipes of every houses.
It will monitor and control the flow of water we get real time data of consumption and can control the valve to restrict flow of water. User can see their usage anytime through dashboard or mobile application.

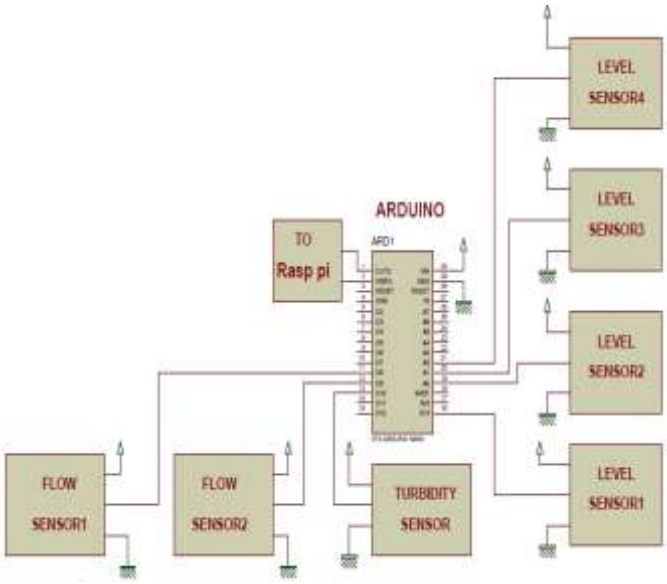

Fig .1 Block schematic diagram of a system

IOT implemented system Feature:

System consists of raspberry pi Arduino level sensor, flow sensor turbidity sensor, GSM module each block is explained below. We are working on a Prototype model. Following block schematic diagram shows hardware used in system. Raspberry pi is a low cost small and portable size of computer board it has a high performance powerful processor its main core language is raspbian OS can also develop script or program using python language. Raspberry pi 2 has CPU 900 MHz BCM2836 q u a d -core A R M Cortex-A7 Memory,1GB RAM, It has a 40 pin
GPIO c o n n e c t o r , micro SD. Purpose of using raspberry pi is an IOT.

System Design And Implementation:

All the data collected from arduino is connected with a raspberry pi and it process continuously and push data on cloud. The Arduino nano is a microcontroller board based On the ATmega328 it is a 8 bit microcontroller has 14 digital input/output pins (of which 6can be used as PWM outputs. Using we are going to collect a data from sensors here, level sensors are connected to analog i/p and flow sensors are connected to digital i/p pins are used.

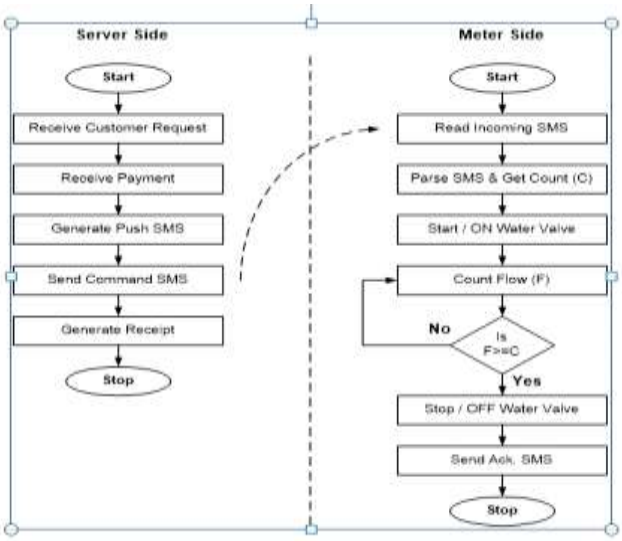

Fig .2 Flowchart t of a system

flow sensor consists of a plastic valve body with a water rotor it uses a pinwheel sensor to measure how much liquid has moved through, water flows through the rotor rolls, speed changes which outputs the corresponding pulse Signal. Flow rate measured in Liters/sec/min/hour. By counting the pulses from the output of the sensor, can easily track fluid movement. Flow rate in our project flow rate is calculated in ml/sec. Turbidity sensor measure the amount of suspended particles, or turbidity in the water. If the Soil level increases transmitted light decreases Turbidity sensors are used to check quality of water.

Level sensor is designed so that, each sensor gives information in 4 levels for two different tanks It helps to sense the level of water present in the overhead tank or sump. As the float rises or falls with level of water in the tank, gets activated GSM (Global System for Mobile communications) is a cellular network, operate in the 900 MHz or 1800 MHz bands. Here GSM is used to trigger a message when there is no water in line or if there is abnormality or theft occurred in water supply line.

Distribution Controller will monitor the flow and consumption of water by each family. The system will get planted on the water supply pipes of every houses. It will monitor and control the flow of water. We get real time data of consumption and can control the valve to restrict flow of water. User can see their usage anytime through dashboard or mobile application

Software design Front End Design:

HTML is a format that tells a computer how to display a web page. The documents themselves are plain text files with special "tags" or codes that a web browser uses to interpret and display information on your computer screen. HTML stands for Hyper Text Markup Language an HTML file is a text file containing small markup tags. The markup tags tell the Web browser how to display the page. An HTML files must have an htm or html file extension.

Cloud Storage: Cloud computing is the practice of using remote servers on the internet to manage, store and process data instead of using a personal computer.The programming language used in this project is C#.NET. It is a general purpose programming language we are using C# for programming. There are different free servers for viewing data on to cloud ADAFRUIT is one of them. Adafruit IOT is easy to use with less errors and simple commands.

Project is divided in three modules:

Hardware Module:

It consists of hardware parts like Flow Sensor,Solenoid Valve, Microcontroller for controlling the flow of water.

Web Server Module:

It consists of server parts like web server, database, web app to fetch and Store the reading of the meter

Website/Application:

It consists of application part like website or mobile application to monitor usage of water.

Implementation Setup:

A feed for each parameter is created Adafruit. First it checks turbidity water here mapping has been done if turbidity of water is less than five motor in ground tank will start automatically otherwise motor will remain off. As motor get started it will fill water in both overhead tanks according to its level of water in tankwater is supplied this valves operate automatically flow sensors gives flow rate in ml/sec. If we want to cut supply of any line we can control it from adafruit by making relay ON/OFF so, controlling is possible from a remote location. If there is no water in any line GSM will trigger a message also if there is excessive consumption in any line it will trigger a message that abnormality in line. The system processes within given time period at adafruit also can operate as continuous process it means proper scheduling is done for distribution. On adafruit server we can see previous record also data continuously pushed on cloud so that we can monitor and control it in real time. 16*2 LCD is used to observe data locally connected to raspberry pi. Below diagram shows detail hardware set up of a system. All the sensors are connected to arduino. It takes data from all the sensor. Relays and LCD are connected to raspberry pi connector. Solenoid valves and motors operated through relay. GSM module has USB through which it is connected to raspberry pi. Arduino is connected raspberry pi through microUSB. Raspberry pi takes data and continuously push it on cloud.

System Requirment:
Hardware:
* Arduino
* Uno/Mega
* ATMega382p
* SIM800 Module
* Flow Sensor
* Solenoid Valve
Software:
* MS SQL Server Database MS
* Visual Studio (ASP.NET)
* Arduino IDE Android Studio

Hardware Design:

ARDUINO ESP8266 ESP8266 is animpressive. Low cost WiFi module suitable for adding WiFi functionality to an existing microcontroller project via UART serial connection The module can even be reprogrammed to act as a standalone WiFi connected device just add power! The feature list is impressive and includes: 802.11 b/g/n protocol Wi-Fi Direct (P2P) soft-AP Integrated TCP/IP protocol stack. NodeMCU is an open source IoT platform

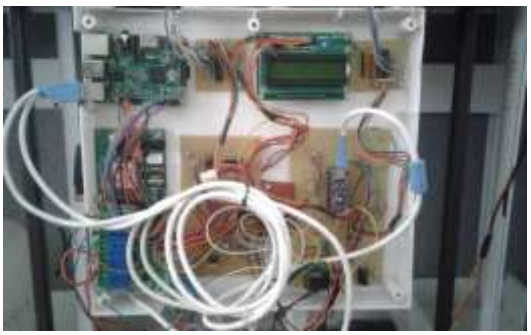

Fig 3: Hardware of a system

In the above figure is a nodemcu esp826 microcontrollers used in the proposed lab automation System installed in the laboratory. This microcontroller comes with the inbuilt Wi-Fi module

Fig 4: Control Board

The above figure shows the connection procedure of the relays used in the lab automation with the AC mains. The NC terminal of the relay is been connected in parallel to the ground line of the wire. The COM of the relays is been connected to the 230V supply line of the switch board circuit.

Graphical User Interface:

The above figure shows the HTML based webpage used to control the ON/OFF functionality of the lights and fans in the laboratory. This page can be used to control the lab automation system by connecting to the Wi-Fi of the NodeMcu esp8266. The Wi-Fi is password protected at the time of setup.

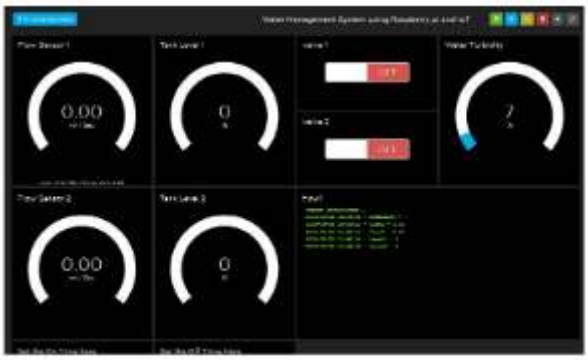

Fig 5: Adafruit server

Above picture shows Adafruit server Feeds are created for each parameter to monitor it. If we double click on each feed it will show previous records also with graphs so that, we can monitor it, Valves are controlled from Adafruit Sensor readings have taken and observed its analysis. Using this this system secure and continuous monitoring is possible No need to go on field for monitoring sc manual work has reduced it makes system more efficient, reliable, low cost and accurate we can Data monitored from anywhere T controlling is possible from a remote server it is Economical in development.

III. Conclusion

The water distribution system over IoT has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully. Controlled remotely through internet The designed system not only monitors the sensor data, like temperature gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. This will help the user to analyze the condition of various parameters in the lab anytime anywhere.

IV. Future Scope

Using this system as framework, the system can be expanded to include various other options which could 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 with respective changes can be or in industries where human invasion is impossible or dangerous, and it can also be implemented for environmental monitoring.

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