METERING AND CONTROLLING OF WATER SUPPLY USING GSM FOR SMART CITY APPLICATION

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Abstract: This work puts forth an idea to provide a solution for water management effectively and efficiently. The growing demands of water in urban areas due to the increased population and the lack of standardization among the water distributors lead to affect the quality and quantity of drinking and domestic water supply. This raises the special concern of water management, which needs to improve the efficiency in the water distribution system. The various advancements in the wireless sensor network technologies provide solution to overcome these challenges. This paper presents a water management system which will continuously monitor and analyze the quality and quantity of water being dispensed at each house through the flow sensor, pH sensor and also allows the user to customize their limits in terms of quantity of water needs. The sensors data are gathered online and stored in the cloud for further data analytics and processing by means of IoT. This helps in the ease of billing and also for prepaid payment. This system cuts down the water flow and notifies the user when the water usage exceeds the limit with respect to the prepaid amount and also when there is an anomalous water quality in the distribution system. This system can be of a great help in smart cities to regulate the supply of water for effective use of the depleting resource.

Index Terms – **IOT systems, Water supply systems, Smart City, Sensors & Microcontroller.**

I. INTRODUCTION

Water is essential for all life. It is also integral to economic development, community well-being, and cultural values. To be sustainable, supply and use of water must ensure that today's water needs are met equitably and in a manner that protects essential ecological processes and allows future generations to meet their own water needs. Without water nothing happens in any kind of environment. Importance of water is fadonly when it is not available. People utilize water for many purposes and consume them by different ways. But there are many issues which arise when they consume in high amount. Enormous growth of residential areas has led to over demand of water to fulfil daily activities; hence water distribution management is necessary. This distribution of water in every house within different areas needs the control and monitoring for preventing the wastage of water. Different technologies have been studied to distribute/supply the water to each and every house of residential areas, every system require water supply facility with performance monitoring system to supply the water equally to each house at required time interval and required quantity. Various technology have been invented using embedded system as the solution to this problem. To overcome those issues here is the method presented to focus on an identified way to increase the performance monitoring for the water distribution, flow monitoring system and automated supply system. Such an integrating system is capable of predicting flow of water and automatic supply of water. It can be done by employing microcontroller. Automatic supply acts as solution for the need of experienced operators and wastage of water during supply.

The system shown here is a microcontroller-based solenoid operated valve system which can effectively control the water supply system. The microcontroller is programmed to operate the solenoid at particular time interval at particular areas. As per the requirement the main pump operates and a microcontroller even turns ON the particular area solenoid also. The water now flows through solenoid and supplies the water to particular area. After the required timed operation the next area solenoid will goes to trigger by microcontroller and the whole system operates at same concept through the microcontroller. The program has been entered to microcontroller. programme the system operates at that schedule of particular solenoid valve. This system provides lots of accuracy and efficiency and thus avoids wastage of water also.

II. LITERATURE REVIEW

S Geetha et.al [1]: has studied Smart solutions for water quality monitoring are gaining importance with advancement in communication technology. This paper presents a detailed overview of recent works carried out in the field of smart water quality monitoring. Also, a power efficient, simpler solution for in-pipe water quality monitoring based on Internet of Things technology is presented. The model developed is used for testing water samples and the data uploaded over the Internet are analyzed. The system also provides an alert to a remote user, when there is a deviation of water quality parameters from the pre-defined set of standard values.

Biljana Let et.al :[2]: has studied Internet of Things (IoT) brings significant advantages over traditional communication technologies for smart grid and smart home applications, these implementations are still very rare. Relying on a comprehensive literature review, this paper aims to contribute towards narrowing the gap between the existing state-of-the-art smart home applications and the prospect of their integration into an IoT enabled environment. We propose a holistic framework which incorporates different components from IoT architectures/frameworks proposed in the literature, in order to efficiently integrate smart home objects in a cloud-centric IoT based solution. We identify a smart home management model for the proposed framework and the main tasks that should be performed at each level. We additionally discuss practical design challenges with

emphasis on data processing, as well as smart home communication protocols and their interoperability. We believe that the holistic framework ascertained in this paper can be used as a solid base for the future developers of Internet of Things based smart home solutions.

Niel Andre Cloete et.al : explain the work that has been done on the design and development of a water quality monitoring system, with the objective of notifying the user of the real-time water quality parameters. The system is able to measure physiochemical parameters of water quality, such as flow, temperature, pH, conductivity and the oxidation reduction potential. These physiochemical parameters are used to detect water contaminants. The sensors which are designed from first principles and implemented with signal conditioning circuits are connected to a microcontroller-based measuring node, which processes and analyses the data. In this design, ZigBee receiver and transmitter modules are used for communication between the measuring and notification node. The notification node presents the reading of the sensors and outputs an audio alert when water quality parameters reach unsafe levels. Various qualification tests are run to validate each aspect of the monitoring system. The sensors are shown to work within their intended accuracy ranges. The measurement node is able to transmit data via ZigBee to the notification node for audio and visual display. The results demonstrate that the system is capable of reading physiochemical parameters, and can successfully process, transmit and display the readings.

III. OBJECTIVES:

- The main objective of this project is to monitor the water supply management system automatically without any human intervention. The supply of water to the various areas is fulfilled as per the requirements of the people and the availability of the water.
- The communication between the operator of the system normally refer to as user and the system is done through GSM. The water supply management system controlled by microcontroller which receives the user messages through GSM module and other required hardware modules are used such and water level detection circuit, power failure detection circuit, LCD display is used to indicate the status of water supply management system and also various information are communicated to user through SMS.

IV. METHODOLOGY

The system shown here is a microcontroller based solenoid operated valve system which can effectively control the water supply system. The microcontroller is programmed to operate the solenoid at particular time interval at particular areas. As per the requirement the main pump operates and a microcontroller even turns ON the particular area solenoid also. The water now flows through solenoid and supplies the water to particular area. After the required timed operation the next area solenoid will goes to trigger by microcontroller and the whole system operates at same concept through the microcontroller.
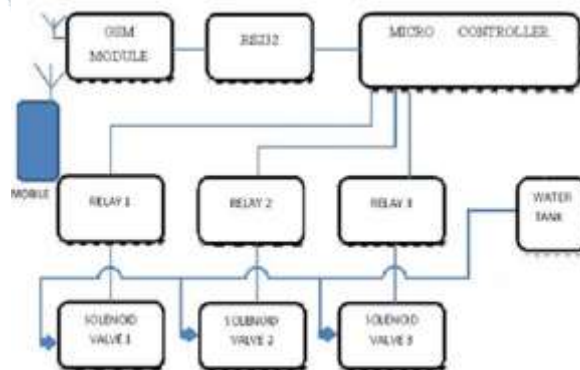

Fig-1: Block Diagram.

The program has been entered to microcontroller. As per the programme the system operates at that schedule of particular solenoid valve. This system provides lots of accuracy and efficiency and thus avoids wastage of water also. Basically, arduino nano is used as a main controller and processes the data, GSM module is used to communicate with the user, all the information sent through the GSM module. A relay is an electrical switch uses an electro magnet to move the switch from the OFF to ON position instead of a person moving.

A proposed project requires following hardware components

- Arduino nano microcontroller

- Liquid Crystal Display (LCD) Module (16X2)

- GSM module

- Relays

- Solenoid valves

- Power supply (battery)

- Jumper wires

A proposed project requires following Software requirements
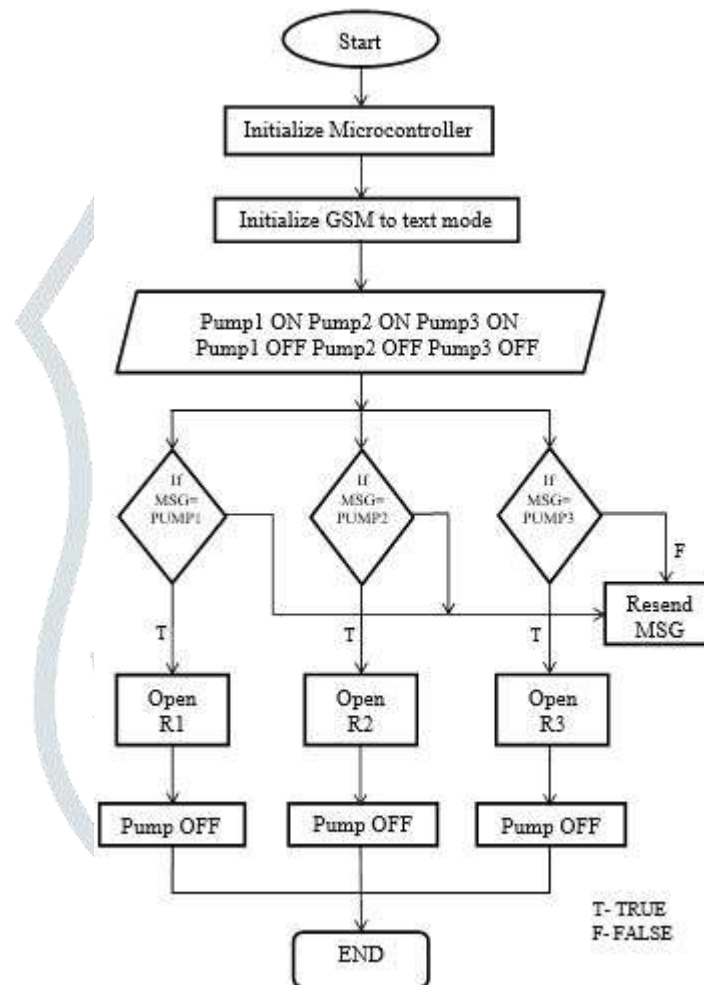
- Programmed through embedded C

Fig-2: Methodology Flow Chart

V. RESULTS & DISCUSSIONS

The executed Program is going to be

int ir_out=2; String voice;

int led=13; int led1=9; int

led2= 10;int m=0;

#include <LiquidCrystal.h>

// initialize the library with the numbers of the interface pins

LiquidCrystal lcd(12, 11, 4, 5,6,7);

```
void setup()
{
lcd.begin(16, 2); Serial.begin(9600);

    Serial.println("at+cmgf=1");
delay(100);

Serial.println("AT+CLIP=1");

delay(100);

    Serial.println();
    //Serial.print("AT+CNMI=2,2,0,0,0\n\r");

Serial.println("AT+CNMI=2,2,0,0,0"); delay(100);

//Serial.println();

pinMode(led, OUTPUT);

lcd.setCursor(0, 0);

    lcd.print("WATER CONTROLLING ");
   lcd.setCursor(0, 1); lcd.print("****SYSTEM****");

  }
  void loop()
  {
  if(digitalRead(ir_out)==1)
  {
  Serial.println("at+cmgf=1");
 delay(1000);                Serial.println("at+cmgs=\"+918951118069\"");

  delay(1000);

Serial.println("WATER IS CONTROLLED");ctrl_z();

  }
   voice="";
  while(Serial.available())
  //Check if there are available bytes to read
   {

      char c = Serial.read();

      //Conduct a serial read

    if (c=='*')
  {voice += c; while(m==0)

    {
      delay(100);
     char c = Serial.read();
```

VI. CONCLUSION

Enormous growth of developing world has led to huge need of water. Automated water distribution and performance monitoring system focuses on various entities such as proper supply, over consumption alert and water quality assurance. The system uses GSM system for communication protocol, provides low cost and long distance communication which helps

in monitoring water supply in metropolitan city. The development of this system can reduce the waste of water resources substantially, and make the management of water even more effective and convenient in the city. By using solenoid valve we control evenly distribute the water to all the areas as per the people requirements. By using this GSM based system users can only control the valve by sending the message and get the water at the required amount of time. By using this technology the wastage of water can be controlled and saves time and makes our city as SMART CITY.

VII. FUTURE SCOPE

- This project when developed on a larger scale can be practically implemented in the Municipal Corporation of any village, town or city.

- The same system can be implemented for automated town electricity management system.

- The automated water distribution system with the various controllers and parameters focuses on the entities such proper supply, flow control, supervision using various protocols.

- It is concluded with the future aspects of real time implementation in the water supply system were scarcity of water is the huge issue.

- Further it can be implemented as controlling supply of water on quantity basis or on time basis using some existing Android app. This app should be included areawise, cross wise requirement of water.

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