Water Distribution Network System

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Abstract - **Water is most essential for the life of living beings, but the current scenario all over the world is that, the wastage of water is increasing day by day and we are left with a very short amount of water for drinking. The main objective of this project is to provide an efficient use of water. The bill which we get from municipal corporations yearly based. The main features of this project include timer based automatic water distribution system, prepaid bill payment as per the usage, impure water for gardening purpose, turbidity check. Hence an efficient distribution of water can be done.**

Keywords — PIC microcontroller, GSM, turbidity sensor, water level sensor, PC, flow sensor.

I. INTRODUCTION

In traditional drinking water supply system is facing many problems related to filtration, pumping of water, distribution of water and testing of water. Conventional water supply department comprises three different sections for water supply. First is the pumping station, which does the sucking of water from source of water. The second section is a filtration department in which measurement of pH and chlorine is done. Third section is the distribution section through which water is distributed in all the municipal wards. Currently these three sections are working independently. The major problems in water supply system are, leakage or wastage of water and the majority public is using suction motors to suck water from main supply connection, which results decrease in water pressure. To overcome above said problems an automated system has been proposed which enhances the water distribution, reduces wastage of water as well as identify the theft of water. The water supply system is a part of the urban infrastructure which must assure the continuity of the water distribution, water quality control and the monitoring. The use of water diversity increases because of restrictions imposed by the water availability, hydrological conditions, storage capability of tank, control and process parameters.

Need: The present system mainly needs human intervention for its successful operation. Due to this its operating speed and accuracy are not satisfactory. This can be improved by introducing automation into it. Present system depends on human labour and manual work resulting in less accuracy.

This system: With the use of automation technologies a higher degree of accuracy can be achieved along with reduction in time. Thus the main aim is to develop a system which is more reliable and user friendly. System reduces manpower, with higher accuracy and less power consumption.

By using this system water consumption can be observed in real time with controlled use of precious water resources. Water resources be managed for future planning. Non-revenue water will be detected and loss can be avoided in distribution system. Water usage can be sent to municipal corporation office /supervisor within fraction of seconds in the form of text message by using existing GSM network. An automatic water billing system was introduced for per day billing and recovery of water charges. Many times it has been seen that a large quantity of water is usually wasted near the source of water, even before the distribution network of water comes into play. As per the survey or measurement of per capita availability of water the conclusion that can be made is that the world is facing a major problem of scarcity of water. The future predictions indicate that India may face water scarcity near about the year 2050. From this scenario, this can be said that the leakages in water distribution system can have a lot of adverse effects on the availability of water. The conservation of water flow includes the policies, strategies and activities so as to manage fresh water by treating it as a sustainable resource, to protect the water environment, and to meet current and future demands of living beings. This system provides automation of water distribution system. The system detects the impurity level of water and according to the need

of user the water will be supplied by the system, so wastage of water will be minimized. As the system used is prepaid, the user will pay the amount as per the usage of water. The impure water containing more turbidity content will be supplied to the garden by the system automatically. This system is GSM based, so the users will send the message as per their need of extra water. Municipal committee uses the yearly based water billing system, but here the system is monthly billing system.

II. LITERATURE SURVEY

There are many methods of water distribution. As population increases day by day there is problem of water scarcity such as draughts and wastage of water, so it is important to manage supply of water. There are several methods of water distribution which are discussed below :

PLC system and manually control of water and the control of water by using SCADA system .

"Design and implementation of water environment monitoring system using gsm technology". In this system the gates of the dam are controlled by using microprocessor by monitoring the water level &according to this proper action can be taken. Wastage of water can be minimized& also by using this system flood can be predictable as gate level of dam is monitored continuously. Main objective of the system is real time monitoring and automation of damis done and system turbidity , pH of water can be measured.[1]

"Urban water supply distributed control system". In this system SCADA system is used and some different points as well as different parameters can be measured such as water level, chemical components concentration, pressure etc & these parameters can be stored, by using data acquisition system in short this system provides control of water distribution and data acquisition. The main objective of this system is to measure parameters(like water level, chemical components concentration, pressure) .[2]

"Automated town water management and billing system". In this paper the water level monitoring and management in accordance of electrical conductivity of the water is introduced. The microcontroller based water level sensing and controlling in a wired and wireless environment is done. The Water Level management helps in reducing the home power consumption and as well as water wastage .Because of disadvantages of traditional methods of water measurement such as in meter reading the errors such as in reading, inaccuracy, external conditions affecting readings, delayed work .The system is meter reading system based on latest GSM technology. In this model wireless sensor network for measuring parameters such as electricity, water is used. The

system consists of a web and cellular based monitoring service protocol which would determine and senses water level and billing[3].

"Potable Water Quality Monitoring and Automatic Billing System". In this system sensor that can monitor the quality of water is used. The customer usage water is measured by using flow sensor. Then monthly water usage can be sent to municipal corporation office using the GSM Modem. The bill is based on the amount of water consumed by the customer and then the payment will be sent to the customer through SMS. This message consists of the bill amount along with date. If the customer payment process is completed on or before the due date, then water supply will be connected otherwise water supply connection will be disconnected. [5]

"Automation in drinking water supply distributed system and testing water" In this paper SCADA system is used to monitor pH & water level according to this, water is supplied continuously by observing water level as well as quality of water is measured. Pure water is supplied to consumer & wastage of water is minimized & pumps are controlled by PLC. Main objective of system is to supply water continuously, real time SCADA system & measurement of pH & chlorine.[7]

III. METHODOLOGY

Water is supplied in a particular interval of time by this system. The system first checks whether the balance is available or not ,if the balance is available then the turbidity of water is checked, if the purity of water in terms of turbidity content is low then water is supplied to garden. If the purity is sufficient then the relay gets ON and the water is supplied from main tank to sub tank and after that it is supplied from sub tank to user. And once the sufficient amount of water is supplied from sub tank to user i.e. the limit of water is achieved the relay turns OFF. And if the user demands for more amount of water after crossing the set limit, then the user need to message the requirement via GSM and then the relay will turn ON for that particular user and water supply will be provided.

IV. SYSTEM DIAGRAM

The system consists of following components: micro-controller (PIC 16F877A), Relay, Pump, power supply, GSM, water level sensor, turbidity sensor. The   controller reads (monitors) inputs, performs processing and writes to (controls)outputs. Firstly Relay turns ON and then checks the water level in the subtank and if the tank is empty, the relay turns ON and the water is supplied from main tank to sub tank and if the tank is full then relay turns OFF. The water is supplied to the user from the sub-tank and pump as well as

relay turns ON, in a particular interval of time. Hence the output of this sensor goes directly to the micro-controller. Turbidity sensor consist of light sensitive device that checks the water is pure or impure that means some kind of impurities are present in water. And if the turbidity is present in the water then the water is supplied for the gardening purpose automatically. In this system GSM is used by the users to send message to the device if anyone needs more water i.e. in case of emergency then water is supplied to that user by turning ON of relay. In PC the user database is created that consists of all the data of the users along with their payment details. This is a prepaid system in which the users have to pay the bill monthly as per the usage of water. If any user fails to pay the required amount then the supply of water for that user is automatically blocked by the system.
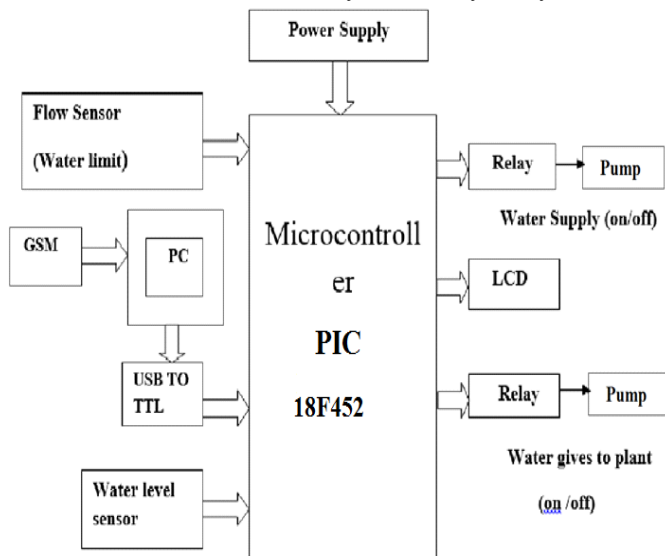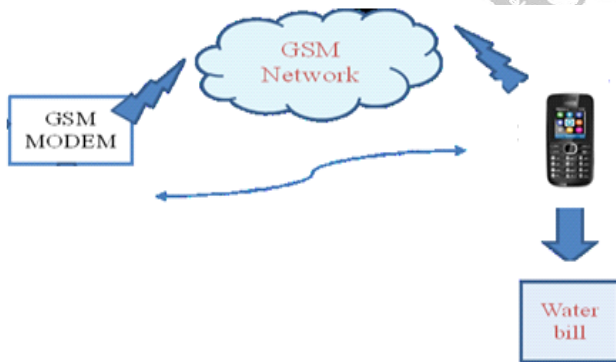

Fig 1: System Design

Fig 2: Schematic diagram to show GSM network.

CONTROLLER: It is main controlling unit of system. It gives output to LCD, GSM and Relay drivers.

LCD: Liquid crystal display (LCD) is use for displaying purpose. It display the user information And value enter by user, water amount and water bill.

GSM: Controller will give amount of water usage by user in the form of decimal values to the GSM Modem. GSM modem

then formats the value in the Message form. By using AT commands.

Water usage can be sent to municipal corporation office /supervisor within fraction of seconds in the form of text message by using existing GSM network. And also message sent to users mobile.

RELAY DRIVERS: Relay drivers are used to drive the motor.

VI. RESULT

- The system results in an efficient distribution of water.
- The different components used are GSM, flow sensor, water level sensor, turbidity sensor, PIC microcontroller, relays, pump, and DC motor.
- The water is supplied in a particular interval of time.
- The turbidity of the water is checked by the turbidity sensor and the pure water is then supplied to the user.
- The wastage of water is minimized by the system. This overcomes existing systems in terms of cost and manpower required.

VII. CONCLUSION

This proposed system gives information about the design of a water distribution system. Water is the most essential need of living beings; the proposed system minimizes the wastage of water. The turbidity of water is checked and then the water is supplied to the user depending upon the purity, and if the water is impure then it is supplied for the gardening purpose. Hence the efficient distribution of water is achieved.

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