Smart Water Distribution System

Rural Area Development

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Abstract

Traditionally water distribution is carried out zone wise. If the new area is developing around the city, a new water distribution zone is developed with a new municipal water tank in that zone. Even in the specific zone, area or society wise water control valves are used manually for water distribution among the different societies or areas. These manual water control valves are used due to the limitation of the required water pressure to supply water to all the areas or societies within that zone. These are opened to provide water in the specific area at a specific time, while other valves in that specific zone are closed to have minimum water pressure so that water can reach to its destination. Another important thing is that the water quality is observed only at the Municipal water tanks which are located zone wise. Hence water quality is not being checked at the end points, where chances of water contamination is present due to rust in the pipeline, hole in the pipeline and some other reasons. Even if water quality is checked at the end points, it is time consuming, labor intensive and all end points are not covered. Hence, there is need of smart water distribution system with continuous water quality check.

Therefore, our goal behind this proposed system is to supply pure water to villagers and give alert message to villagers about timing of water arrival. Proposed system provides solar system as an alternative option to electricity, when it not available. Proposed system provides facility of underground pipeline fault detection in summer and winter season.

Keywords: toxic compounds, sanitation, public health standards.

I. Introduction

Water is an indispensable natural resource for the survival and well-being of humankind. It is also essential for production of food, farming, energy that contributes to the economic and industrial development of a society. Safe and reliable supply of water is essential for individual welfare and community development. The first and foremost consequence is lack of safe water for community consumption is diseases. Infectious diseases occur mainly due to the lack of protected water supply systems.

Water is essential factor for human being. It is important to remember that water is not a permanent resource available throughout the year. However, it can be recycled. Today, overhead or underground tanks store water in our homes of the cities. In ancient India, many traditional practices existed to harvest or collect water from rain, streams and rivers. A water harvesting system is one that collects and stores water for later use, especially in summer, when water is scarce. India's use of traditional water systems dates back 7,000 years where they knew the importance of water harvesting. Water is also mainly used in drinking purpose for survival of life. Water transposition is in traditional way.

Internet of Things (IOT) is a novel paradigm that is rapidly gaining popularity in the modern world. IOT makes possible the development of a huge number of applications, of which only a very small part is currently available to our society. The IOT domain includes Healthcare domain, smart environment (Home, Office, Plant), transportation and logistics and many more. "Water Distribution System" using IOT will make this overall work automatic so that manual intervention is not required for the distribution of water.

Objectives

The objective of proposed system are:

- To provide pure water supply.
- To provide the status of tank like underflow and overflow.
- Status of tank whether it is washed or not.
- Using buzzer or speaker to inform the people before arrival of water.
- If electricity is not available, use solar system to provide continuous water supply.
- Automatic water distribution instead of manual water distribution
- Detection of pipeline leakage.

Scope of the system

The scope the system is defined on the basis of various functionalities provided by the system

[1] Mainly in villages: For drinking and household work.
[2] Farming field: Overall farming is done by water.
[3] In industries and organizations: Construction, drinking
[4] Societies: Societal life is depending on water
[5] Hospital: Drinking
Almost everywhere, where water is used for daily life.

DELIMITATION OF THE STUDY

The water pollution is depending upon various parameters of the water like PH, turbidity, conductivity etc., as the variations in the values of these parameters point towards the presence of pollutants [1][5]. Water quality is an important factor in human being, the records show that more than 14,000 people die daily worldwide due to modification of water resources and international down to individuals wells. In India predictable 580 people die of water pollution related illness every day [1] Mainly WSN technology is used to sense the water quality, in which group of sensors are use, some sensors are place at remote locations that sense the water parameters and send updates to the base station, GSM model is use to alerts the clients [1] The goal of this project is to design and manage a Wireless Sensor Network (WSN) that helps to monitor water quality[2][5] Ms.T.Deepiga, Ms.A.Sivasankari [2] propose a method transmission purpose GSM and Zigbee technology is used and also in this project Tank Water Level Monitoring, is used to avoid overflowing and intimate level of water in the tank. This thesis motivation is to prevent the water by using technologies and the monitoring system uses daily life device like laptop or mobile phone[2] This system measures parameters by using wireless communication providing quality control, record keeping and analysis using simulation software at base monitoring station. The parameters that are analyzed and control to improve water qualities are pH level, turbidity, temperature and quantity of rain water.[5]

In this paper smart wireless sensor network is use for monitoring leakage detection of water pipelines by measuring relative pressure of the plastic pipes[3]Underground Wireless Sensor Network (UWSN) use for a pipeline monitoring system it helps to detect the leakage or damages of the underground pipelines.[2][3]. In the proposed UWSN each node communicates with both nodes in front and behind itself via RF signals. For every 4–5 nodes (up to maximum of 10 nodes) there is a master node which has the capability to communicate with the sensor nodes via RF transmission. Moreover, these master nodes should be able to connect to the internet and transmit the received data from the nodes to the cloud. Leak detection in water pipelines, we use the pressure into the pipe using on force sensitive resistors (FSR)[2]

Findings

The above reference system is mainly focusing on the monitoring water quality in river/lake. And our propose system goal is to design system for monitoring water quality in water tank. There is many problems related to current water distribution system e.g. water leakage, the propose system provide solution to all the problems given in above references.

EDUCATIONAL IMPLICATIONS

In the current traditional system, we face many problems as laid down below such as,

- No system for alerting the impure water supply.
- No fixed schedule of water arrival.
- Tank being washed properly or not is unindicated.
- Water tank if full; overflow is done due to which we have wastage of water supply or even if tank is empty there is no system that notifies it.
- If electricity is unavailable water supply stops.
- Underground water pipeline leakage detection is not possible.
- Hence we need to propose a new system to overcome all of these.

DESIGN OF THE STUDY

Our circuit requires a power of 5 v dc and 12v dc. So, power supply of 5 and 12v volts is designed using a step down transformer with rating of 0-12v/2Amp. Bridge rectifier is used to convert AC signal to rectified positive signal. A filter capacitor of 1000uf is used to filter this waveform. A voltage regulator named 7805 and 7812 is used as output device of power supply.

PIC controller is used as the main control unit for the project which is interfaced to all sensors, GSM module and devices. This is a 8 bit controller with 32 GPIO and one serial port.

GSM module SIM 800 is used to communicate using GPRS data. This module is interfaced to PIC controller using serial port via RX and TX pins. Using this we can send 8 bit data serially.

Ph sensor is used to measure the PH level of water so that we can detect the acidity of water. This data will be uploaded to server using GPRS data.

Moisture sensor is a resistive type which changes its resistance which is measured using in built ADC of PIC controller. This sensor is used to detect the leakage in the pipe line.

Motor1 and Motor2 are the output valve for the water to be distributed to people.

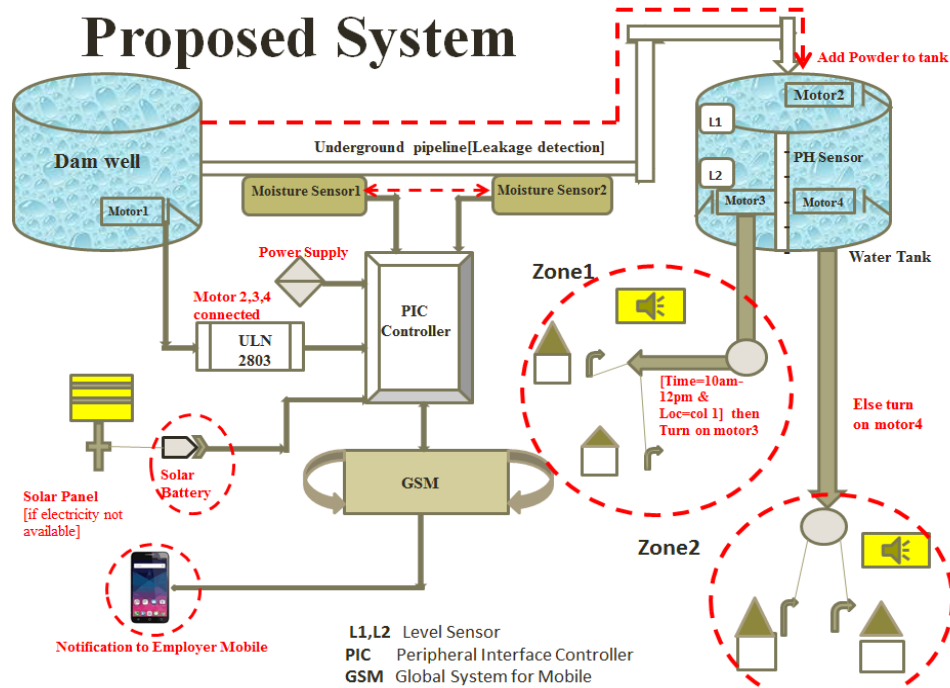BUZZER will indicate the person before water starts flowing. It is used as the alarm unit.

Fig.1 Architecture of Proposed System

Algorithms

Algorithm to detect leakage

In proposed system water is supplied from dam to tank if there is any pipeline leakage in between them then moisture sensor will sense it and notifies to water supplier through GSM.

1. Start

2. If sensor detects moisture then

       Notify to employer

3. Stop
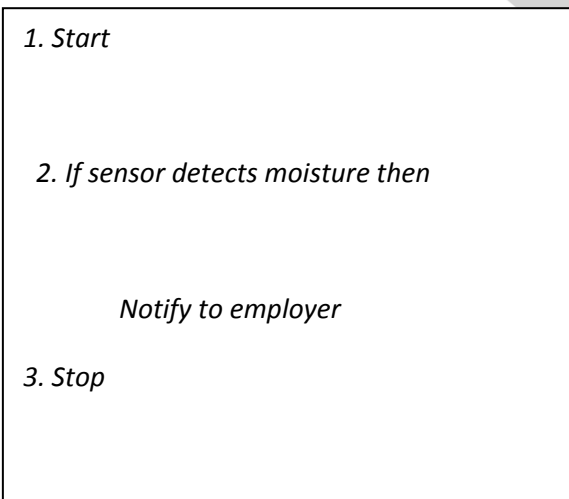
Algorithm for solar system

Also water quality, its underflow and overflow is detected by PH level sensor.

After that water is supplied from tank to different zones before water arrival alert message is given to the people through speaker or buzzer.

1. Start

2. If electricity is available then

regular water distribution using electricity

Algorithm for Water Distribution

In absence of electricity water is not supply from dam tank therefore people faces many problems regarding water for it proposed system provide solution as solar system so that in absence of electricity solar system will supply water from dam to tank.

1. Start

2. Set timer and location

3. If time==10am-12pm and loc==col1

Then on val1 and on buzz1

4. else

on val2 and on buzz2

5. Stop

STATISTICAL TECHNIQUE USED

1. Android, PHP,AWS
2. PIC Controller

Conclusion

Water is one of the most important basic needs for all living beings. Recently, sensors with high sensibility and low price are on the market. With the growth of Internet, we can send and receive data everywhere in the world. Three different ways to monitoring the water such as water level monitoring, water pollution monitor and water pipeline leakage detection. The use of natural solar energy helps to reduce power consumption & operating cost. Another important fact of this system is the easy installation of the system where the base station can be placed at the local residence close to the target area and the monitoring task can be done by any person with minimal training at the beginning of the system installation.

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