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Smart System Application for Water Supply Management using Web Technology

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Abstract

With the rapid development of Smart city, Smart water is an important part of Smart city, which is paid more and more attention. It obtains and deals with urban water information through information technology. It can effectively manage urban water supply, the sale of water and other processes. At the same time, due to the popularity of Smartphone's, Smartphone applications have covered every aspect of life and become an indispensable part of people's daily life. Through the Smartphone applications, the user can achieve online mobile water purchase, query the water situation, water quality and other basic situation, greatly facilitate the use of the user, for wisdom water construction is of great significance.

In this paper, the water management system based on Android is designed and implemented according to the user's needs. It includes intelligent water meter terminal, monitoring canter server, Smartphone application and wireless communication network. The user can use the Smartphone at any time and at any place to view the user's water information in real time providing great convenience for users. So its application prospect is very broad as an important part of smart city.

Keywords: Smartphone's, Smart City, Cloud Technology, and Performance Evaluation.

1. Introduction

In recent years, GPRS wireless digital mobile communication network rapid development, especially the new 4G era of open, provides a wireless access Internet service for mobilephone terminal, making the Smartphone become the most extensive Internet mobile terminal. Government information construction will also establish mobile egovernment with mobile devices dominated by Smartphone's. Now more and more cities began to develop applications in Smartphone's and other mobile terminals, which also created convenient conditions for the development of water information. With the development of the smart water, the water department has developed moreand more humanized service application management software for users, allowing users to real-time query and access to water information, but also set up a faster and more accurate communication interactive platform of the people's livelihood. The water management system has monitoring centre service, smart phone application, and intelligent terminal and wireless network. It involves many key technologies, such as 4G, wireless networks and data processing.

2. Literature Survey

A. N. Alkali, S. G. Yadima, B. Usman, U. A. Ibrahim and A. G. Lawan in their study they propose that Maiduguri Water Supply Scheme designed by its consultants in 1983 has divided the town into five water supply distribution zones.Zone 3 is one of three remaining zones in the city without a distribution network supplied from the Maiduguri water treatment plant. Consequently, residents obtain water from local water vendors, who retrieve the water from shallow boreholes which has proven to be tedious, cost ineffective and physically exhausting. A water supply network was proposed with the aid of EPANET software and the results obtained conformed to the design criteria established by the previous designers of the Scheme. A total water demand, projected for the year 2031 of 420LPS, minimum pressure head of

14.08m and maximum velocity of flow in the pipes of 1.24m/s was obtained. The use of EPANET software has proven to be time saving and its application is especially for the analysis of larger distribution networks is recommended.

Emengini, Ebele Josephine, Unigwe, Ozioma in their research paper titled "Development Of A Gis-Based System For Management Of Water Distribution Network Of Achara Layout Enugu, Enugu State, NIGERIA" have identified inefficiencies in water distribution and management of water distribution facilities is commonly attributed to absence of a functional management system. This has been identified as a major issue facing water distribution agencies in Enugu State, Nigeria. Thus, there is need to develop a system that will help improve service delivery and facilitate infrastructural maintenance. This study applies Geographic Information System (GIS) in the management of water distribution network for Achara Layout Enugu, Nigeria. To execute this study, a number of datasets were used such as Achara layout design plan, map of existing water pipelines, the design plan and map of existing water pipelines. These datasets were obtained from the Ministry of Lands and Survey, Enugu State and Enugu State Water Cooperation. This study suggests the efficiency of the developed system in enhancing understanding and management of water distribution system.

Bhavana K. Ajudiya, Dr. S. M. Yadav, Prof. B.H.Pandit has published a paper "Water Distribution Network Design and Analysis": A Case Study. This paper concerns for the design of rural water distribution systems in developing countries. For designing of best economical water distribution system LOOP version 4 heuristic software is used with a case study. Design procedure satisfied all constraints with a minimum total cost. The constraints include residual nodal pressure, velocity of flow in pipe, pipe material, reservoir level, peak factor and available commercial pipe diameters. In investigation, it is found that water distribution network cost

occupied almost 70% of the total cost of water supply system. Extensive research has been done to minimize cost through optimization in design of water distribution network. In addition to the simulation tool, optimization techniques to identify the least cost design of distribution systems, while achieving the most equitable distribution of water have been developed.

Nikhil Hooda, Om Damani discussed the classic problem of the capital cost optimization of branched piped networks consists of choosing pipe diameters for each pipe in the network from a discrete set of commercially available pipe diameters. Each pipe in the network can consist of multiple segments of differing diameters. Water networks also consist of intermediate tanks that act as buffers between incoming flow from the primary source and the outgoing flow to the demand nodes. In this work, the authors motivate why the choice of tank configuration is important to the design of a network and describe an Integer Linear Program (ILP) model that integrates the same to the standard pipe diameter selection problem. To aid the designers of piped water networks, the improved cost optimization formulation is incorporated in our existing network design system called JalTantra.

Dr. H. Ramesh, L. Santhosh and C. J. Jagadeesh have worked on Simulation of Hydraulic Parameters in Water Distribution Network Using EPANET and GIS. For this they worked on generation of satellite based thematic layers, town and ward boundary maps and Geospatial Information System based census data and to estimate water demand, design of transmission lines and main pipe lines to meet the requirement of future demand. GIS has been used to integrate and estimate quantity of earth work to be excavated in terms of cutting and filling through Digital Elevation Model (DEM). The pipe network system is simulated to understand its behavior for different inputs using EPANET 2.0. In the present study, both single period and extended period simulation were carried out for distribution network system for one ward.

Simulation has been carried out for hydraulic parameters such as head, pressure and flow rate. Here the results obtained from EPANET are crosschecked against hydraulic calculations and found correct.

3.Problem Description

3.1 Existing Framework

Human life as all with plant life and animal life is totally dependent on water. Water is considered as a basic component of our life, not only we need water for proper metabolism and functioning of our body but also we need it for various purposes as growing food, power generation, to run industries. Hence, demand of potable water is increasing with corresponding increase in population that has lead to serious global issue, Water crises. This ever increasing water demand can be satisfied by designing efficient water distribution system based on advanced computing systems, hydraulic modelling and design software's.

In the existing applications Requirement and Location of customer is not considered anywhere. Location of supplier is also not monitored. Also in the existing systems, there is no option to view the reviews of users for dealers. Hence most of these applications increase the customer's dependency on a particular dealer.

3.2 Proposed Framework

The proposed mobile application works purely based on location and there is no need of dependency on particular dealer. Anyone who is in need of water can request for the suppliers nearby according to their requirement. The supplier gets notified by user's request and user's need of water is satisfied accordingly. Advantage of the proposed mobile application is its

simplicity, effectiveness of time, user friendly and cost effective. In the next section the modules of the proposed applications are explained.

4. Implementation

4.1 Login Page

Customer does not require registration or login process. They can directly choose the supplier which is present in next module. For water suppliers, they can login using their unique user id and password provided for them. If the supplier is new to the app, they must register themselves by providing their details regarding the water supply and proof of identity.

4.2 Registration of Dealer

In this module, the details of the dealer are obtained for registration process. Name of the dealer, their dealership name, and phone number for contact, location where they provide service, Identification number for proof and maximum capacity of water they can provide are needed to be submitted for registration. After verification, the user can get a unique user id and password for login.

4.3 Booking for water

Customer can search for water by mentioning location and amount of requirement of water. List of available dealers is displayed and customer can choose the dealer. Then notification which contains the location of the customer and his requirement is sent to dealer. The dealer can accept or decline the offer according to his ease. If the offer is declined, the customer can switch for next dealer. If the offer is accepted, the customer gets the details of the water supplier**.**

4.4 Feedback Submission

When the water is supplied in the location, the customer can give their suggestions in the feedback form. In feedback form, the customer must give their name, phone number, Location where the water is supplied. They can rate the supplier and compliment or give suggestions to the dealer and submit their comments. After submission, the dealer gets the notification of completion of service. This feedback is stored for other customers who requests for this particular dealer.

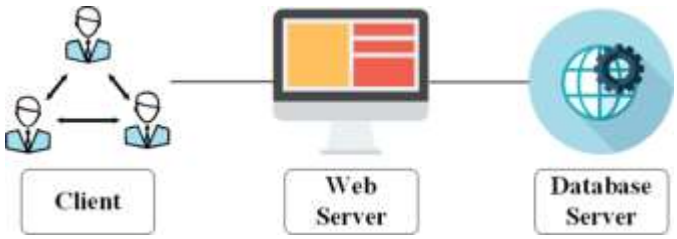

Figure. 1. System Architecture

5. Conclusion & Future Work

Every innovation in this world tries to help the human kind. This application would ease the process of providing water for people in the metropolitan city like Chennai where there is a great need of water. It also maintains a good relationship between people and dealers at low cost. This proposed application has been partially implemented in future it has been uploaded in the Google Play store.

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