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Waste Water Management for Smart cities

A. Mythili ,D.Vinodhini , M. Maheshwari

Student, B.E. Computer Science and Engineering, Anand Institute of Higher Technology, Chennai, India[1,2]

Assistant Professor, CSE, Anand Institute of Higher Technology, Chennai, India[3]

ABSTRACT: In smart cities, water problem may arise in the summer season and wastewater can be reused to solve this problem. Wastewater is the water once used and it requires cleaning before reuse. It can be reused for various purposes such as for planting, washing, and other purposes. The home and industry are the major sources for releasing a large amount of wastewater. This water should be treated before reuse. In this paper, a new cloud assisted wastewater management system (CWMS) is introduced to clean the wastewater; reuse based on its purity and shares it globally. The proposed CWMS contains three different steps such as primary, secondary, and tertiary treatment and various sensors have been incorporated for checking the quality (pH, turbidity, salinity, etc.) of treated water. For testing, the wastewater is taken from two places of the study area, Bangalore city, India, and various parameters have been studied. An experimental setup has been developed using Arduino UNO and the performance of CWMS is tested for two different wastewater types. All the details about the treated water have been updated in the cloud for global access and proper utilization**.**

KEYWORDS: Waste water management.

I. INTRODUCTION

Wastewater treatment is an important component in the water cycle, as it ensures that the environmental impact of human usage of water is significantly reduced. Wastewater treatment plants (WWTPs) use a series of treatment stages to clean up the contaminated water so that the treated effluent is safely discharged to inland water, estuaries and the sea. Wastewater treatment consists of several processes (physical, biological, and chemical) that aim to reduce nitrogen, phosphorous, organic matter, and suspended solids content. The purpose of WQM is to support the control of these processes by accurately monitoring water parameters (e.g., nitrate, nitrite, phosphate, and pH) mainly in the influent and effluent of each WWTP. Specifically, WQM performs (i) the detection and quantification of these parameters in the influent wastewater that could affect the treatment.

The main attribute of the system in the industry for wastewater management is interoperability. It will provide communication among several systems. The local automation system is functioning independently for managing wastewater. To optimize the behavior, a pumping station is integrated with the wastewater treatment plant . In the wastewater treatment plant, the main process is the sludge process. The wastewater is controlled depending on the concentration of dissolved oxygen in the aeration tank.

Two different software such as Adroit SCADA and MATLAB have been used to study various parameters . Due to high non-linear operating conditions, wastewater management is a complicated process. For reducing production cost and removal of wastewater an integrated automation system was developed. Here the quality of wastewater has been determined through different sensors and an automation system is integrated.

2. EXISTING SYSTEM

Provide an application which allows residents and visitors of a city to find out more about water management-related aspects about the city. Aspects include information about water supply and waste water management for the city. The site might also provide real-time information about flooding, water supply handling water-related work projects (water supply repair, waste water treatment, etc.).The application could provide information about water management-related studies and/or projects that the city is working on. Anything from measured bacteria and contaminant levels in rivers and streams, water supply, and waste water egress to new water management projects and their status, to water management analysis and reports. The site could also provide safe water use instructions, what to look for, what to avoid, and so on.

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3. OVERALL DESIGN

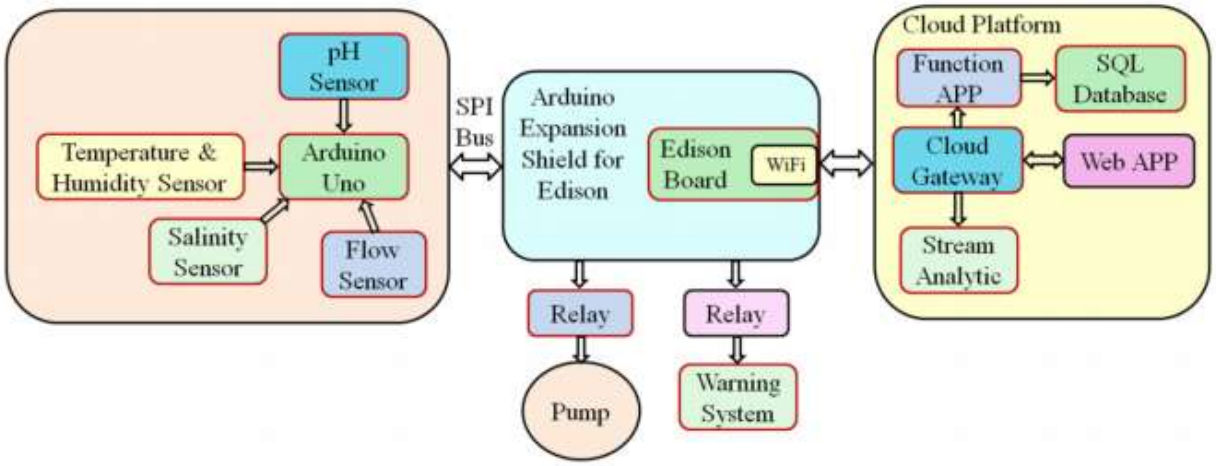

Fig. 3. Architecture of the proposed CWMS

4. MODULES

1.pH sensor
2.Temperature & Humidity Sensor
3.Flow sensor
4.Arduino

The pH sensor is used to check the pH level of the treated water, for light salty water the pH=7.2-7.5, for pure water pH=6.9-7.5, and for sparkling type pH=4.9-5.5. After the treatment process, the controller checks the quality of the water and pumps it into the required place. After the treatment process, the controller checks all the signal level of the sensors and estimates the quality of the wastewater. A threshold level (THD) has been set for all the signals received from the sensors. If THD value is greater than the estimated value (EV) the controller estimates the purity level and sends them all the information (quality, location, amount of water, etc.) to the cloud server. The stored data can be accessed by anyone who needs treated water (TW).

Various sensors such as turbidity, pH, flow, level, conductivity, and chlorine sensors have been incorporated to monitor the CWMS and the collected data is updated in the cloud. The THD value for the entire sensor has been set and the controller always watches the status, updates the information in the cloud. The Atmrga328P with Edison board is linked to the IoT hub through the WiFi network. The hardware is developed and implemented using Atmega328P In this study, two different types of wastewater have been considered for the test. The hardware which is used in CWMS.

6. CONCLUSION

To avoid water problem arise in the summer season the wastewater is treated and cleaned for reuse. The proposed CWMS updates the information in the cloud for easy accessing. Initially, the wastewater from different sources has been collected in a central point and the wastewater is processed under three different steps. A threshold value for each parameter has been set and verified. The obtained results show that the proposed CWMS exactly identified the reuse of wastewater for a particular purpose. In this study, two different types of wastewater have been taken for testing. The result shows that the first type of water is suitable for agriculture and the second type indicates that it is suitable for washing purpose. It shows that the efficiency of the proposed CWMS. It is also important to note that the management of treated water ought to be done with the help of the cloud. The plant details can be shared and the reuse of wastewater is easily managed.

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