Survey on Smart Water Management System

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Abstract –*Water is an essential resource on earth, 71 percent of earth's surface is covered with water but less than 1% of the earth's water is drinkable and also more than 5 million people die each year from diseases caused by unsafe water, lack of sanitation and insufficient water for hygiene. Over two million deaths occur each year from water related diarrhea alone, so conservation and maintaining the quality of water is very important. In this paper we are performing survey on various technologies that will be useful in order conserve water as well as to maintain the quality of water.*

Keywords: **IOT system, calculable, observance, standard of water, pH, temperature, turbidity, pipe leak, criminal water sound area, pressure sensor.**

1. INTRODUCTION

The current era's conservation effort has been thought of globally because the major focus towards protective water resources for a much better future. A lot of conservation effort has targeted on the technological advancement of water exploitation appliances so as to create them additional water economical. That's to mention the foremost economical means of conservation is incorporated exploitation the advanced technology. However, since user interaction with water exploitation appliances, that is itself influenced by the habits, rituals, and expectations of water use. Also, the consumption of polluted water has caused a lot of people to suffer from water borne diseases. The common water borne diseases are cholera, amoebiasis, bacillary dysentery, giardia, cryptosporidiosis etc. These diseases are in most cases are fatal. These are caused by consuming un-treated water. Basically, such kind of cases were present in sub-urban Areas and poor countries. Now a days there are few impurities that is being supplied to the residential areas. When people consume the polluted water, they are affected by the water borne diseases. Thus, a system has to be created which contains an integrated features of water consumption techniques and to detect polluted water supply. Additional analysis is required that focuses on the user. Whereas most user have a favorable angle to conservation, several provide no thought to the number of water they consume daily. While variety of users declare that they fight to avoid wasting water throughout the day, proof shows that they to adopt straightforward water saving actions the impact on water consumption is comparatively little. Those that strictly believe conservation or say the importance of water tend to require account of water consumption figures once getting new appliances put in reception. However, the bulk of user instructed that they'd wish to increase their information of water stress problems and welcome further, data's that concerns the environment and money consequences of wasting of water, ways in which on however they'll save water within the house, and additional details data on conservation ways. This system entitled "water management system" makes use of the foremost advanced however reasonable technologies and technique for its incorporation. The system incorporates bound ways that cause a restriction to the number of water usage per house, helps in alerting the resident relating to any water leak. This can be an excellent chance to cut back home water consumption through improved user information once incorporated in giant scale.

2. LITRATURE SURVEY

2.1. Design and implementation of price effective water quality analysis system

This is a microcontroller-based water quality and purity detection system containing features such as water's temperature, turbidity, and pH is detected. Detection of those parameter are vital so as to guide a healthy life. During this system-based analysis work, an easy microcontroller is employed as central processing unit and multiple sensors that detects varied parameter and sends the info to microcontroller and at last the liquid crystal display offers the results. The enforced device performs supported the electrical properties of water and accommodates microcontroller, Liquid Crystal Display, differential electronic equipment, power electronic equipment, thermistor, turbidness sensing element, hydrogen ion concentration electrodes and different parts. Microcontroller is that the major element that's used for measure the water quality. Voltage distinction across the sensing element is collected through channel A of the microcontroller and channel B of the microcontroller is connected to the Liquid Crystal Display that specific the worth of parameter as digital variety. Associate generator is employed as digital variety. Associate generator is employed to offer clock pulse to the microcontroller.

Advantages:

- Cost effective
- It evaluates all the 3 parameter of water such ph, temperature, turbidity

Disadvantage:

- Accuracy is not high
- Thermistor can monitor only smaller range of temperature

2.2 Water quality monitoring system using IOT and Machine Learning

This is a system that helps in detecting the impurities present in the supplied water by making use of IoT technology. This helps in saving people of rural areas from various dangerous diseases such as fluorosis, bone deformities etc. the system has the capability to detect the temperature of water. This system which monitors water quality through sensors such as pH, turbidity and temperature and updates those values in Cloud service. The system consists of sensors that measures the amount of chemical composition in the supplied water. The detected values are sent to NodeMCU micro controller which has inbuilt WIFI module, thereafter using Stream hub data is streamed to external services. PowerBI which is also a Microsoft platform is used to display the sensor values in the form of Web page. This paper also uses MQTT client broker architecture to transmit data from micro controller to external MQTT broker service. Other part of this paper is to sense the external temperature near the water storage and control heater or cooler respectively depending on temperature. This part of paper uses machine learning, where the system predicts the weather conditions using previous labeled dataset and controls heater and cooler according to external weather conditions. This makes the system completely automated without any manual interventions. Whenever the worth of turbidness reaches predefined threshold associate email alert are sent to involved authorities informing things, forcing them to require immediate action.

Advantages:

- This eliminates the usage of heavy computing devices such as arduino UNO and raspberry pie
- It uses Node MCU which is light weight as well as cost effective

Disadvantages:

- Temperature is measured using the concept of machine learning which require massive dataset to train on

2.3. IOT enabled water observation system:

This system provides the feature of an automated water usage observation. The most plan behind the level of water are a vital parameter just in case of disaster-prone areas. Water level sensors are placed in these areas, just in case the water level reaches the most limit that has been set then the signal can feed real time social network like twitter. A cloud server is organized as knowledge repository. The measure of the water levels is displayed in remote dashboard. This system inculcates a similar technique in a very tiny scale, wherever the water level sensors area unit placed within the tank and therefore the level of water is measured within the tank and it's uploaded to the cloud and from there to the web site that the water level within the tank may be viewed. In this paper IOT primarily based water system is deployed victimization two totally different sensors. The info transmission of those sensors is completed by integration a wireless entranceway among the patron network. The controller board supported the ATmega328p was deployed for the image style. Ultrasonic detectors area unit organized to work out the space between the sensors and water level in a very tank the sensor sends out the wave and transmits the info into Liquid Crystal Display to display the space in centimeter. A custom-made cloud server is deployed to host the water knowledge analytics schema. Knowledge assortment for the system is organized in terms of your time stamp, days and week within the web-based dashboard.

Advantage:

- People will be alerted with the occurrence of flood.
- The measurements of water level are displayed in remote dashboard.

Disadvantage:

- This system uses ultrasonic sensors which are not precise.

2.4 IOT based smart water tank using android application

This is a system that helps in monitoring the water level likewise as controls it with IoT and automaton application. Wastage of water, simply because of overflowing tanks isn't cheap. Typical water tanks will neither monitor nor management the water level in tank that intern ends up in wastage of huge quantity of water. In most cases, water tanks area unit manually controlled by associate operator. In absence of the person, water keeps on overflowing till motor is transitioned. Just in case of sensible cistern, it implements IoT primarily based system victimization that user will directly monitor and management the operating of tank through the sensible phone and from anyplace within the world, it may be put in in existing water tanks with no demand of recent tank. The values of most and minimum levels area unit obtained from psychic phenomenon from base cloud. This level of water is obtained from the supersonic detector. Relying upon these values the motor is turned ON/Off. The disadvantage of this method is that it's helpful to automaton users and just in case if there's network issue the system doesn't perform as expected. The proposed

system overcomes this disadvantage by mechanically transitioned the water victimization sensors. Also the possibility of paying the bill online can be done through the application on development.

Advantage:

- It is possible to control the flow of water from any part of the world.

Disadvantage:

- Usage of mobile phones is restricted in certain areas in such situations this concept does not work.
- This application is supported only by Android operating system.

2.5. Automatic water level detector associated controller system:

This paper proposes the best means of police investigation the water level within the overhead tank victimization the fashionable and rising technologies like IoT, Machine Learning for prediction and Cloud Computing for storing, that replaces the standard means of analyzing the water level. By incorporating this technique, helps in investigating the water level within the tank. The proposed system alerts the user to consume the water consequently. The design of the systems water level detector device, that's ready to notice and management the extent of water in a very sure cistern, ideally associate overhead tank. The system at the start detects the extent of water obtainable within the tank with the assistance of water level detector and so adjusts the state of the pump in accordance to the water level data. The systems electronic styles achieve the machine-controlled method through the consecutive logic, enforced employing a flip flop. Additionally, a seven section show and a relay-based motor pump driving circuit area unit a part of this integrated style. Upon usage the pump mechanically activates and starts filling the tank once the water level is empty or level ONE and turned-off and stop filling the tank once water level reaches maximum-level NINE; what is more, the pump can stay in its standstill state from level EIGHT right down to 2 once the extent is decreasing because of water consumption. The sensors area unit assumed antimonial conductor probes from the very best purpose to very cheap purpose of the overhead tank. These electrodes area unit inserted within the overhead cistern with its water level to be monitored. Since the electrodes area unit primarily counting on the physical phenomenon of water to gift a resistance and shut the circuit, the employment of electrodes can meet the potency and accuracy needed with terribly low price. The digital logic controller circuit is that the one accountable for the automation of the system that sends signals and performs the change ON and OFF the motor pump. once

water within the tank or the same instrumentation is empty or at level ONE, the pump are triggered and be in switched ON condition and thus pumps water into the tank. Whereas the water flows through the degree upwards, the pump state can stay ON till the extent 9 is reached, wherever at this level a sign is shipped to trigger the pump OFF. Whereas within the transitioned condition, the extent of water decreases because of consumption for the aim it's serving.

Advantages:

- Notifies the user regarding the day to day water usage.
- Updates the user with current water content in the tank.

Disadvantages:

- Exact water content in the tank is not predicted.
- Damage in one of the water level sensors (especially the top most water level sensor inside the tank) will lead to extra water supply to the tank and overflow occurs.

2.6. Design of water management system:

This paper proposes to introduce the strategy of water level observance likewise as dominant it by making use IoT and automaton applications and ideas. Surplus wastage of water among this state of affairs is that the foremost reason for water shortage across the globe. Major reason of water shortage in urban areas is simply due to the overflowing of tanks that's sometimes not avoidable. Typical water tanks can neither monitor nor management the water level in tank, leading to pile of wastage. Other technologies had certain drawbacks in some or the other means that. The need of removal of these short-comings and providing a cheap and economical resolution has been the foremost focus of this system. Sustaining water resource is one all told the foremost issues egress recently due to uncontrolled wastage of accessible liquid. In most of the cases, water tanks unit of measurement manually controlled by an operator. In absence of the person, water keeps on overflowing until the motor is transitioned. In another comes, that unit of measurement automatic, dip sensors unit of measurement implemented. As a result of being to bear with water, there is a high probability of oxidation of cloth used in detector. The conventional means that can entirely management the water level domestically, i.e. the operator is required to remain fastened watch fixed on correct functioning. Smart vessel implements IoT, with which, the user can directly monitor and management the operational of tank through the smartphone and from anywhere throughout this world. This system is place in in existing water tanks with no demand new tank for this purpose. The automaton application is developed in Massachusetts Institute of Technology app creation.

Counting on the water level among the tank, the standing of motor area unit getting to be automatically controlled. If water level is in between the quantity, then the user can management by toggling the standing of motor via the automaton application. The application is meant in such a way that it will show the moment value of current standing of water in share. The height of tank is to be set once in psychic phenomenon. This height shall be accustomed verify the share of water. Calculations of this water level area unit getting to be through with this. Making alternatives with share proves to be easier to implement the logic in programming.

Advantages:

- Water tank capacity is set for every house.
- Can be controlled from anywhere in the world.

Disadvantages:

- Since tank capacity is fixed, requesting for extra water on top of the full capacity of the tank will lead to overflow of tank. Thus, requesting of extra water supply is impossible.

3. CONCLUSION

In this paper we have surveyed various technologies used to conserve water as well as maintain the quality of water and we have also discussed the advantages and limitations of various technologies used in conserving and maintaining the quality of water. The main goal of our paper was to make a survey on various water conservation and quality monitoring techniques used and how the system can be further enhanced.

REFERENCES

[1] Faruq, M. O., Emu, I. H., Haque, M. N., Dey, M., Das, N. K., & Dey, M. "Design and implementation of cost-effective water quality evaluation system" 2017 IEEE Region 10 Humanitarian Technology Conference

[2] Kumar Koditala, N., & Shekar Pandey, P. "Water Quality Monitoring System Using IoT and Machine Learning". 2018 International Conference on Research in Intelligent and Computing in Engineering

[3] Perumal, T., Sulaiman, M. N., & Leong, C. Y. "Internet of Things (IoT) enabled water monitoring system". 2015 IEEE 4th Global Conference on Consumer Electronics

[4] Shah, P. P., Patil, A. A., & Ingleshwar, S. S. "IoT based smart water tank with Android application". 2017 International Conference on I-SMAC

[5] Getu, B. N., & Attia, H. A." Automatic water level sensor and controller system". 2016 5th International Conference on Electronic Devices, Systems and Applications

[6] Ntambi, F., Kruger, C. P., Silva, B. J., & Hancke, G. P. (2015). Design of a water management system. AFRICON 2015

BIOGRAPHIES

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