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Water Level Management Using Internet of Things (IoT)

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ABSTRACT: In the modern era, as the world population increases tremendously, providing clean and efficient supply of water is one of the biggest challenges. Water quality needs to be monitored in order to ensure safe supply of drinking water. Flow of water should be controlled so that it doesn't go waste. Traditionally, water flow is managed through locks and controlled manually but it was very lengthy process. Due to recent trends in technology and increased connectivity, a system of IoT devices is best choice for managing water grid. A new technology called Long Range (LoRa) is explored in the proposed system which is narrow band low power wide area network (LPWAN) technology. LoRa is used for communication of IoT devices and requires very low power. LoRa devices communicate with each other over the range of 3-5 Km in sub-urban area. Proposed system involves various sensors deployed at various locations which measure real time quality of water which examines water quality. System generates notification to the higher level of authorities through SMS or email in case of any issue. Furthermore, it controls flow of water in timely manner. The sensors interfaced with a micro controller in the LoRa module will communicate to the cloud through the LoRa gateway. Web page provides interface to both residence as well as authorities regarding quality of water.

I.INTRODUCTION

As cities experience exploding growth so it is necessary to ensure they can operate sustainably. The trend of global urbanization brings about advancement in the digital technologies and design of smart cities. Water management system is city's most important piece of infrastructure. Water as a critical resource for human survival is well documented. It is required for drinking, sanitation, agriculture, manufacturing among others. Although roughly 70% of the earth is covered by water, only 2.5% of this water content is fresh water suitable for use in the mentioned activities. This presents us with a challenge of optimizing the usage of the available quantity of fresh water and ensuring a sustained supply of it. Even with fresh water being such a scarce resource, a large portion of it flows directly into the oceans without ever being used by the society. Such scenario exists because of slow response mechanism as well as poor resource management.

There are various technologies existing today to facilitate M2M-IoT communication for smart city development. Wireless communication technologies are well established and consist of clearly defined standards.

These technologies are geared towards network throughput instead of reducing the power consumption. With advancements like Bluetooth-Low Energy (BLE) and Zigbee, power consumption is taken as a major consideration, but these technologies still fall short due to having only short range capabilities. Technologies like GSM and Long Term Evolution (LTE) provide a massive range which aims to provide higher and higher network throughput at the cost of power consumption. Long Range (LoRa) Radio is one of the recently introduced LPWAN technologies. It provides large coverage than previously mentioned cellular and short range technologies.

People deal with severe issues related to the quality and improper maintenance of water. There are problems related to mixing of clean water with the sewage, incomplete water treatment, intermittent water supply and inefficient management of flow control gates. Proposed solution tries to address many of these problems using a system of connected low powered long range devices which communicate among themselves. The resolution of water quality issues is sped up by automatically sending out alerts to the local authorities instead of waiting for the residents to complain about it. The supply of water is monitored by sensors fitted in the village's central water tank. The streamlining of the water supply continues with the automation of water locks employed in and around the village to control the flow of water in canals. The scenario before the proposed solution was employed would entail a series of events where a resident would pass the information to the village panchayat, with automation; information can be instantly passed on to the authorities who can then decide to alter the locks in a very short time.

The main advantages of using LoRa in this study are:

- Signal Propagation – LoRa permits to alter our signal frequency, thereby allows to optimize the signal for the exact scenario in test area.
- Minimal power consumption – LoRa provides years' worth of life using simple AA batteries. Alternatively, a solar cell could be connected to the LoRa device, making it have a virtually unlimited lifetime.
- Large coverage – LoRa allows to change spreading factor. Higher spreading factor gives large coverage.

II.LITERATURE REVIEW

This paper explains the water level monitoring and proposing on using the Wifi or wireless based type of monitoring using the Arduino. This paper deals with brief explanation of using Arduino to automate the homes. The hardware and software specifications are also explained. A prototype for Water Level Monitoring is developed for detecting water level through the internet. A central device like microprocessor connects to the internet and receives orders to control sensors. A server manages the users and devices. Android Application acts as a front-end to interact. This paper presents the design and implementation concepts for a wireless real-time Water level monitoring system based on Arduino Uno microcontroller as central controllers. The proposed system has two operational modes. i) manually-automated mode in which the user can monitor and control the home appliances from anywhere in the world using the cellular phone through Wi-Fi communication technology. ii) self automated mode that makes the controllers be capable of monitoring and controlling different appliances in the home automatically in response to the signals comes from the related sensors. A hardware implementation with Matlab-GUI platform for the proposed system is carried out to show the reliability of the system thus making it a simple, cost-effective and flexible resulting as a good candidate for the smart city.

N. Sreenivasaa, Mohan B.Ab, PiyushKumar Pareek,E. G. Satish [1] proposed an introduction of the Internet of Things (IoT) enabled the development of various real-time applications. In reality, IoT has facilitated the remote monitoring or sensing. A variety of networked sensor nodes can be deployed to provide a periodic or continuous monitoring data, that can be used further evaluation. In this paper, we demonstrate the use of IoT for water quality monitoring using LoRa as communication system. The water body is used for aquaculture, and many aquatic organisms are observed and studied to improve aquaculture ecosystem. LoRa is allow-power wide area modulation technique, that consist of a base station for the collection of real-time data from the sensors in the water body and a user interface/Dashboard is designed for better visualization of data for information analysis. We conduct some performance tests to determine the reliability and efficiency of the system, and the results are also presented.

Smita Patil, Bhushan Vidhate, Prof. Sunil Somani.”, 2019 [2] is proposed of a new technology called Long range (LoRa) is explored in the proposed system which is narrow band low power wide area network (LPWAN) technology. LoRa is used for communication of IoT devices and requires very low power. LoRa devices communicate with each other over the range of 3-5 Km in suburban area. Proposed system involves various sensors deployed at various locations which measure real time quality of water which examines water quality. System generates notification to the higher level of authorities through SMS or email in case of any issue. Furthermore, it controls flow of water in timely manner. The sensors interfaced with a micro controller in the LoRa module will communicate to the cloud through the LoRa gateway. Web page provides interface to both residence as well as authorities regarding quality of water.



S. Brindha¹, P. Abirami², V. P. Srikanth³, A. Aravind Raj⁴, K. Karthik Raja⁵ [3] is nowadays, the systems are operated manually and no single individual is aware of all the operating parameters of the whole system. Automating the system will enable prevention of water wastage a monitoring easier. The existing systems doesn't have a proper data base of flow, pressure, level and other ground conditions. So, we want to collect those data using flow, pressure and purity monitoring sensors. It resolves this by automating the leakage detection and also it is detecting in real time. so, we can immediately rectify the leakage as fast as possible due to instant alert sent to the intended authority/ person. He authority also can view the part/location of the pipe where the water is leaking.

Wei Chen, ¹Xiao Hao, ²JianRong Lu, ³Kui Yan, ¹Jin Liu, ¹ChenYu H,² and XinXu [4] is moreover, the system uses STM32L151C8T6 microprocessor and multiple types of water quality sensors to collect water quality parameters in real time, and the data is packaged and sent to the LoRa gateway remotely by LoRa technology. Then, the gateway completes the bridging of LoRa link to IP link and forwards the water quality information to the Alibaba Cloud server. Finally, end users can realize the water quality control of monitored water area by monitoring management platform. The experimental results show that the system has a good performance in terms of real-time data acquisition accuracy, data transmission reliability, and pollution alarm success rate. The average relative errors of water temperature, pH, turbidity, and conductivity are 0.31%, 0.28%, 3.96%, and 0.71%, respectively. In addition, the signal reception strength of the system within 2 km is better than -81 dBm, and the average packet loss rate is only 94%. In short, the system's high accuracy, high reliability, and long distance characteristics meet the needs of large area water quality monitoring.

Simitha K. M, Subodh Raj M. S "IoT and WSN Based Water Quality Monitoring System" 2019[5] is the proposed system based on IoT and WSN gives real-time data of water quality so that the authority can manage and conserve the valuable water resources more effectively. With IoT & WSN, smart monitoring and management is attainable. It helps create more efficient city services and to keep citizens informed. The existing systems of water quality monitoring uses wireless technologies which are short range and much power consuming, which are not suited for sensors nodes in WSN. The proposed system presents a low cost, low power, long range and scalable approach for water quality monitoring using LoRa module based on LoRaWAN protocol which is Low- Power Wide Area Network (LPWAN) technology, which is much more efficient than many existing systems.

No.	Paper Title	Author Name	Key Points	Remark
1	LoRa Based Water Quality Monitoring System	N. Sreenivasaa, Mohan, Piyush kumar pareek, E. G. Satish, 2022	We demonstrate the use of IoT for water quality monitoring using LoRa as communication system [1].	Improves the performance of tests to determine the reliability and efficiency of the system and the results are also presented.
2	LoRa based Water Management System	Smita patil, Bhushan Vidhate, prof. Sunil somani, 2019	It requires very low power LoRa devices communicate with each other over the range of 3-5 Km in suburban area [2].	Web page provides interface to both residence as well as authorities regarding quality of water.
3	Efficient Water Management Using LoRa in Advance IoT	S. Brindha, P. Abirami, V. P. Srikanth, A. Aravind Raj, K. Karthik Raja, 2019	The systems are operated manually and no single individual is aware of all the operating parameters of the whole system [3].	we can immediately rectify the leakage as fast as possible due to instant alert sent to the intended authority/ person.
4	Research and Design of Distributed IoT Water Environment Monitoring System Based on LoRa	Wei Chen, Xiao Hao, JianRong Lu, Kui Yan, Jin Liu, ChenYu H, and XinXu, 2021	the gateway completes the bridging of LoRa link to IP link and forwards the water quality information to the Alibaba Cloud server [4].	The experimental results show that the system has a good performance in terms of real-time data.
5	IoT and WSN Based Water Quality Monitoring System	Simitha K. M, Subodh Raj M. S, 2019	It helps create more efficient city services and to keep citizens informed [5].	short range and much power consuming, which are not suited for sensors nodes in WSN.



In summary, the work presented in this paper is built on previous research to explore how security of data stored on cloud relates to people's trust. While earlier work focused on data storage impacts people, we focus on its impact on the world wide acceptance of cloud.

III. LITERATURE REVIEW

HISTORY OF WATER LEVEL MONITORING SYSTEM:

Water Level Monitoring can be found in many areas since before. Various types of Water Level Monitoring system based on the control are:

1. Individual systems:

This is a very popular type of systems. Here the whole model is implemented on a targeted single source system.

2. Large Control Systems:

Here the water level is implemented on a very large scale basis and huge amounts of sensors or used.

3. Central Control Systems:

Computerized systems programmed to handle all the functions of multiple utilities like air conditioning system or home entertainment systems, refrigerators all at the same instant regardless of your presence. Control system can be accessed through telephone or internet from any corner of the world.

Based on the method of automation various types are as follows:

1. Bluetooth based Water Level Monitoring:

Here Bluetooth plays a major role in alerting the anomalies.

2. Remote Water Level Monitoring:

In this, the system is controlled remotely.

Since safeguarding water along with other resources is extremely respected in current scenario, various authors have been suggested several solutions in accord with the worries adjoining them. A perky discussion for students, engineers, researchers, and in public administration is IoT based water monitoring. These configurations have proven that demonstrated the human interferences can realize significant surge in efficiency. The vogue of IoT related innovative technologies are emerging due to its potentiality in evolving various practices and only some part is available at present in the society. Its domain includes healthcare facilities, logistics, intelligent habitats, and numerous others. Imperative approaches have been employed to restraint the wastage of water resource and produce superior economic achievements. Furthermore, corroborate the conservation of nature and water cycle in such a manner that can be moved on the resources to yonks. A system composed of Arduino for the automated principles of supplying of water into the tanks with the assistance of sensors which can notice the water level.



IV. METHODOLOGY OF PROPOSED SURVEY

HISTORY OF WATER LEVEL MONITORING SYSTEM:

Water Level Monitoring can be found in many areas since before. Various types of Water Level Monitoring system based on the control are:

1. **Individual systems:** This is a very popular type of systems. Here the whole model is implemented on a targeted single source system.
2. **Large Control Systems:** Here the water level is implemented on a very large scale basis and huge amounts of sensors or used.
3. **Central Control Systems:** Computerized systems programmed to handle all the functions of multiple utilities like air conditioning system or home entertainment systems, refrigerators all at the same instant regardless of your presence. Control system can be accessed through telephone or internet from any corner of the world.

Based on the method of automation various types are as follows:

4. **Bluetooth based Water Level Monitoring:** Here Bluetooth plays a major role in alerting the anomalies.
5. **Remote Water Level Monitoring:** In this, the system is controlled remotely.
6. **Automatic Water Level Monitoring:** The system is programmed to automatically perform some defined actions.

Since safeguarding water along with other resources is extremely respected in current scenario, various authors have been suggested several solutions in accord with the worries adjoining them. A perky discussion for students, engineers, researchers, and in public administration is IoT based water monitoring. These configurations have proven that demonstrated the human interferences can realize significant surge in efficiency. The vogue of IoT related innovative technologies are emerging due to its potentiality in evolving various practices and only some part is available at present in the society. Its domain includes healthcare facilities, logistics, intelligent habitats, and numerous others. Imperative approaches have been employed to restraint the wastage of water resource and produce superior economic achievements. Furthermore, corroborate the conservation of nature and water cycle in such a manner that can be moved on the resources to yonks. A system composed of Arduino for the automated principles of supplying of water into the tanks with the assistance of sensors which can notice the water level in the container. The pumping system will operate as per the defined indicators for certain levels of water, and in parallel, on a LED display the status is displayed for the observers. Further, this system can be elongated to automate the process of fetching water from the sump. Aforesaid action plan for computing the level of water with the aid of sensors in the sump, possibly used in such situation if such system senses the water level to be less, then it averts the pumping motor from functioning to make sure of the well-being from dry running. A notifying sound could be initiated in such cases alerting the user concerning the issue. Here came another prototype model for this topic, developed for detecting water level using the internet. Another author suggested a method assisting to realize the benefit of Bluetooth modules and how efficiently it can be produced as a compact device.

Similar tract dealing with concise elucidation of enabling Arduino in the process of automating the In comparison with other existing systems using the Bluetooth method, the restrictions were also in demonstrating that Arduino with Android converges for a finer method in automation. The related specifications for the applied software according to the usable hardware arrangements are also explained. Eventually, a GSM based arrangements came into action, in which an advanced technique is brought forward which constantly keeps a record and is capable of



handling the functionalities of system using their mobile network, as even in case of certain water level in containers like a raised water tank, the operator can report to the registered module towards recognizing the particulars of a peculiar tank, as well as capable of regulating the pump impulsively by turning OFF when the commentative amount of water filled up and sends the message back to the handler mentioning the status of tank. Hence, it's focused in managing with reinforcement of ultrasonic sensor accompanying the GSM technology.

In another presented paper based on SMS notification, it is a smart system as every single process happens to be automatically updated by the micro-processing unit, via GSM technique. So, this mechanism is depressed of somewhat noise also has an efficacious converting action. Broadening its implementation, safety alarming system is considered as a suited application. Thus, intended arrangement is conceivably exercised at home, offices, and even in industries. As introduced, there is no connection between the reservoir and another tank, subsequently, disclosure connecting the two can push the project to highs.

V.CONCLUSION AND FUTURE WORK

In this paper, The continuous innovations in technology are to make human life simpler and efficient. IoT devices are in pole position to create meaningful solutions due to their simplicity and versatility. LoRa devices paired with sensors provides best solution to monitor real time water quality over long distance and generates auto alert mechanism in case of degradation of quality. System provides web interface to both residence and authorities regarding quality of water. This IoT based proposed system is used to acquire water level and its evaporation details of a water source in real time from any location, any device connected to Internet. This water evaporation data can be used for various purposes for better management of water source.

REFERENCES

- [1].Smita Patil, Bhushan Vidhate, Prof. Sunil Somani. "LoRa based Water Management System",2019
- [2]. S. Brindha¹, P. Abirami², V. P. Srikanth³, A. Aravind Raj⁴, K. Karthik Raja⁵ "Efficient Water Management using LoRa in Advance IoT",2019.
- [3]. N Sreenivasaa, Mohan B.Ab, PiyushKumar Pareekc, E. G.Satishd "LoRa BASED WATER QUALITY MONITORING SYSTEM"2022.
- [4]. Farmanullah Jan¹,ORCID,Nasro Min-Allah¹,Saqib Saeed²ORCID,Sardar Zafar Iqbal² and Rashad Ahmed "IoT-Based Solutions to Monitor Water Level, Leakage, and Motor Control for Smart Water Tanks"2022.
- [5]. Wei Chen¹,Xiao Hao²,Jian Rong Lu,³Kui Yan,¹Jin Liu,¹ChenYu He,²and Xin Xu "Research and Design of Distributed IoT Water Environment Monitoring System Basedon LoRa"2021.
- [6]. Sommart Promput¹, Somkiat Maithomklang¹, Chawalit Panya-isara¹ "Design and Analysis Performance of IoT-Based Water Quality Monitoring System using LoRa Technology"2023.
- [7]. HaozheZhang, LongHe, FrancescoDiGioia, DaeunChoi, AntonioElia, PaulHeinemann "LoRaWAN based internet of things (IoT) system for precision irrigation in plasticulture fresh-market tomato"2022.
- [8]. Simitha K M, Subodh Raj M S "IoT and WSN Based Water Quality Monitoring System" 2019.
- [9]. Biswaranjan Bhola Raghvendra Kumar ,Hoang Viet Long "Cloud Integrated with LoRa Watermeter Network: A Water Expense Repository"2021.
- [10]. Saloni Khandelwal Prateek Dubey "IOT based Water Monitoring System"2020.



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