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Smart Aqua Tracking System Using IoT

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Abstract: *Water is an elixir of life. With the rise of urbanization and digitalization of the world, there is a need to monitor the water quality and quantity in both locally and globally. Smart Aqua Tracking System using IOT is a cutting edge technology that provides an efficient and cost-effective solution for monitoring and managing water quality. To monitor water levels and track the flow rate of water. The system is designed to monitor water levels in storage tanks and to detect water leaks. This system utilizes IoT sensors to collect real-time data on various parameters such as pH levels, total dissolved solids and water flow rate. The sensors measure the water level and temperature of the water, while the microcontroller processes the collected data and sends it to the web server. The web server stores the data and displays it to the user. The system also provides an algorithm for calculating the water flow rate. With Smart Aqua Tracking System, the higher officials can make informed decisions about water usage, conservation and remediation efforts leading to improved sustainability and environmental outcomes.*

Key Word: *pH sensor, Pressure sensor, Turbidity sensor, GSM and GPS module, IoT.*

I.INTRODUCTION

The Smart Aqua Tracking System using IoT is an innovative solution designed to help in monitoring and tracking aquatic systems in real-time. This system employs the use of advanced sensors and internet of things (IoT) technology to gather data and transmit it to a central server. This data can be accessed by authorized users to monitor and manage water conditions, track aquatic life, and optimize the system's performance. The Smart Aqua Tracking System offers numerous benefits, including reduced costs, improved accuracy and increased efficiency. It allows users to monitor water levels and detect water leakage and contamination, while also providing predictive analytics to assist in decision-making. It is a cost-effective and efficient way to manage and protect water resources, while also providing valuable data for research and development. It is the perfect solution for any organization or individual looking to better understand and manage their water resources. The proposed system uses an pressure sensor for identifying the variation of the pressure in the distribution of water in both inlet and outlet.

II. EXISTING SYSTEM

Different surveys have done to find out the impact of parameters chosen in the water monitoring systems. Methods of Hyperion, water quality index, and hazard quotient as the criteria for concluding the water quality. The survey discussed the various Physio-chemical parameters like temperature, pressure, pH, electrical conductivity, biochemical oxygen demand (BOD), oxidation-reduction potential (ORP), etc., and the impact of them in disturbing the quality of water. AquaConnect is an IoT-based smart aqua tracking system that provides real-time monitoring of water quality, temperature, and other environmental parameters. It uses sensors that are placed inside the water to collect data, which is then sent to a central server for analysis.

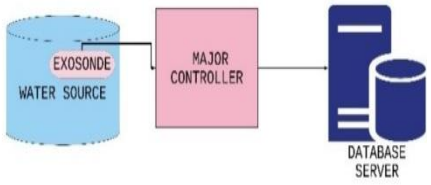


Figure1: Design of the existing system

The system can monitor water quality automatically, and it is low in cost and does not require people on duty. The data transmission layer of the monitoring system consists of a wireless communication device. The data transmission methods available are GPRS, Wi-Fi, Ethernet, etc. with security features. The work by Peng et al uses GPRS to send the aggregated data to the monitoring stations and to alert the user through the message using a sim card. The drawback of such systems is the additional cost for a sim card.

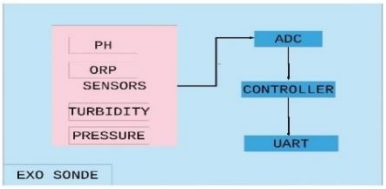


Figure 2: Design of the EXO SONDE

The monitoring station monitors and processes the quality parameters. Alarms will be given based on the monitored data. Code Division Multiple Access (CDMA) is used as a medium of data transmission to the monitoring center. The data transmission terminal, data transmission equipment, and the monitoring center are connected over the internet. The CDMA will transmit and receive data to achieve communication between the DTE and the monitoring center.

The data received by the primary controller is transferred to the server for monitoring. The data at the controller side is been collecting inside the file system before it is handed over to the GSM state machine software.

III.PROPOSED SYSTEM

To remotely monitor the water usage in a specific area. The purpose of this proposed system is to check the water quality using various sensors to ensure whether the water is fit for drinking purpose. The sensors used to check the quality are pH sensors, turbidity sensors etc. Then the sensed value is compared with the Government standards. For example, the pH value for drinking water is about 6.5 to 8.5 and turbidity level should be at least 150ppm. If it does not meet the above standard, then it will be retreated to the vegetation and plants. Then it measures the water level and transmits the sensed data to the server where it can be analyzed and monitored.

The second part is to avoid the leakage of water, we analyze the pressure of the water in both inlet and outlet. If any deviation in the water pressure, then it recognizes it as a leakage of water and through GPS module it will give an alert notification with location via SMS to the admin.

The various sensors used in this proposed system are,

1. pH sensor – To monitor the pH content of the water in real-time
2. Turbidity sensor – To check the water contaminants and amount of suspended matters
3. Flow Rate sensor/Pressure sensor – To measure the flow rate of water to detect leakage.
4. GPS module - Allows tracking of the current location of the leakage.
5. Notification – To send the alert message to the admin via SMS and email.

A. pH Sensors :

pH sensors can be integrated into a smart aqua tracking system to monitor the pH of the water in real-time. The sensors can be placed in different locations within the infrastructure such as the tank or the filtration system to provide a comprehensive view of the water quality. The sensors can be connected to a central control system that can analyze the data and trigger alerts if pH levels fall outside of the desired range. This can help operators take corrective action before any damage.

B. Turbidity Sensor:

.Turbidity sensors are devices used to measure the turbidity of a water sample. It is a measure of the amount of suspended particles in water and the clarity of water. It is mainly used for drinking water analysis.

C. Pressure Sensor:

Pressure sensors can be used to measure the water level in tanks. By monitoring water levels, operators can prevent overflows or maintain optimal water levels. Pressure sensors can be placed in pipelines or pumps to monitor water pressure changes. This data can be used to detect blockages, leaks, or other issues that can impact the water flow rate. It can be

integrated into a control system to automate certain tasks such as adjusting the water flow rate or activating pumps. This can help reduce the workload on operators and ensure consistent water conditions.

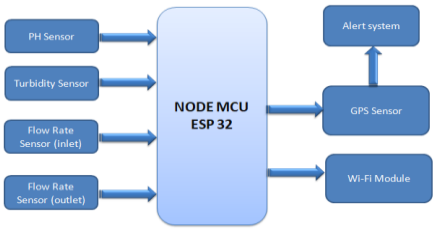
D. GPS Module:

By integrating GPS modules into a smart aqua tracking system, operators can remotely monitor the location. GPS modules are capable of providing accurate and reliable location and time information. They are also used in navigation.

These are the sensors used in monitoring the water quality in terms of its total dissolved solids, Turbidity and water dissolved solids.

E. Block Diagram:

The block diagram for the proposed system is as follows,



Smart Aqua Tracking System using IOT is a system which can be used to track the water levels in rivers, lakes and other water bodies. It uses a combination of sensors, Internet of Things (IoT) technology, and cloud-based software to monitor and track data related to the water levels. At the hardware level, the system consists of a series of sensors that measure the water level in different locations. These sensors are connected to a computer or microcontroller board via a communication protocol such as I2C, SPI, UART, or Ethernet. The data is then transmitted to a cloud-based software platform where it is analyzed and converted into meaningful information. The software platform allows users to view real-time data on the water levels in different locations, set alarms for when water levels exceed certain thresholds, and generate reports on water levels over time. Additionally, users can access the data through a web-based user interface or via a mobile application. The system can also be used to identify and alert authorities of potential floods and drought conditions in the surrounding area. This is done by comparing the data from the sensors with publicly available weather data from the National Oceanic and Atmospheric Administration (NOAA). The Smart Aqua Tracking System using IOT can provide valuable information to government agencies and local communities, enabling them to better prepare for and respond to flooding and drought conditions. In addition, the data can be used for research purposes to better understand the impacts of climate change and water pollution on water levels.

IV. CONCLUSION

Smart Aqua Tracking System using IoT technology has the potential to revolutionize the aquaculture industry. By leveraging the power of sensors, communication technologies, and cloud computing, such a system can enable real-time monitoring, control, and optimization. By automating certain tasks such as feeding and water circulation, operators can reduce workload and improve the overall efficiency.

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