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Smart city-water management system using IoT and Microcontroller

Madhav Pujari[1], Pratik Shetti[2]

[1,2]*Student, Dept of E&TC Engineering, Pimpri Chinchwad College of Engineering, Pune, Maharashtra, India.*

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ABSTRACT:This research paper is about water management in cities. Water is a valuable source for all the lives on earth. The effective management of water to ensure the welfare of every life is essential. The increasing extra usage of water, the wastage of water, keeping the tap open unnecessarily tend to waste a lot of water.

For this the proper analysis, management and execution is expected. For maintaining the good quality of water and avoid wastage of water, an appropriate strategy should be evolved and implemented. India In the worldwide water quality index, India is towards the bottom of the list of 122 countries, and many parts of the country still lack access to clean water. In metro cities, on the other hand, one individual waste roughly 0-45 litters of water every day. As a result, we devised a clever and creative management system to address this issue and assist people in becoming used to using water wisely. The people participation plays a vital role in this. As water is the basic necessity of everyone and it needs to be managed efficiently.

KEYWORDS: Watermanagement, RFID, IOT Water management

I. INTRODUCTION

Water management is the process of planning, developing and managing the optimum use of water resources. Water is the basic necessity of every living organism, no one can survive without water. In the worldwide water quality ranking, India is ranked 120th out of 122 countries. In addition, many sections of India lack sufficient drinking water. Pollution, population, and basic sanitation are only a few of the issues we face, but water related issues are a key one. Water-related diseases account for about 21% of India's ailments, and 1 in 5 children under the age of 5 die as a result of polluted water, poor sanitation, or poor hygiene. Almost two out of every three people do not have access to safe drinking water and live on less than $2 per day. In metro cities, on the other hand, where there is a constant supply of water, an average individual wastes around 50 to 70 litres of water each day, which is a massive amount. As a result, we've devised an innovative method that will successfully persuade society to save water. As a result, our concept will assist us in determining the quality and quantity of water used by individuals based on daily updates. Just ten buildings can save 1,08,00,000 litres of water per year. Communities and the government will profit immensely if water resources are adequately managed. Water management results in more efficient water use and sewage expenses, as well as better summer irrigation controls and reduced energy waste. Water that is clean and safe is also ensured through good management, which protects public health. Prioritizing water management aids in the elimination of water waste and the maintenance of your water infrastructure. Your water bill will be lower if you use water effectively, and there are various additional methods to save money on water. You'll be able to notice when your facility—or even individual equipment—is using water unusually if you're familiar with its water consumption and have greater insight into its water infrastructure. Water management can also assist you in finding ways to recycle the water in your building. That not only saves you money, but it also decreases the pressure on your community's common water supply.

II. PROPOSED SYSTEM

A. Automation at common water source using RFID sensor

We will set up automation utilising RFID in every building at a central location. So, in an apartment, each resident will receive a personal RFID badge that he or she may use to access a shared water supply. People squander far more water at public water supplies than at any other source, such as washing automobiles, bathing their dogs, and so on. As a result, we're employing RFID technology to update the amount of water utilised

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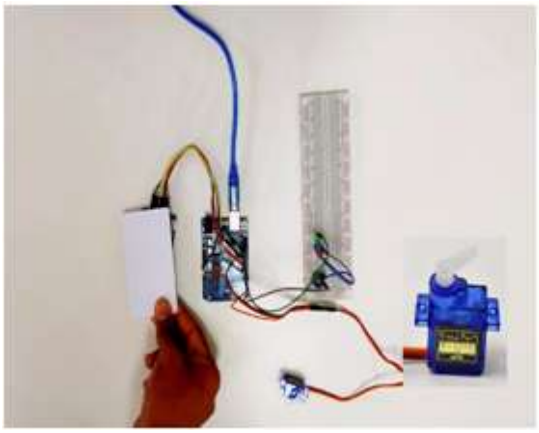

Fig- 2.1: RFID With Ardiuno

by an individual at the water bank. At first, the RFID tag will be used to identify the individual, and if he or she is from the same society as the RFID tag, then only he or she will be given water to use. If the RFID tag does not match the record data, then no water will be given to the individual because he or she may belong to a different society. Similarly, automation at public water sources will function.

Fig- 2.3: RFID in denied access

B. Water sensor interfacing with IOT:

The Hall Effect water sensor will be installed at the pipe that enters the flat. The ESP module will be linked to the water sensor, and the data will be sent to the cloud. We'll collect data one by one and keep track of it. As the individual consumes water, the water bank will be updated in real time to reflect the amount of water used. For e.g., suppose if my plan for water usage is 150 litres and I used 30 litres water for morning bath, then the water remaining for me to use in the remaining day is 120 litres likewise the system works. If a person uses 50% or 90% of water from his daily limits, he will get an email/app/website notification using IOT cloud.

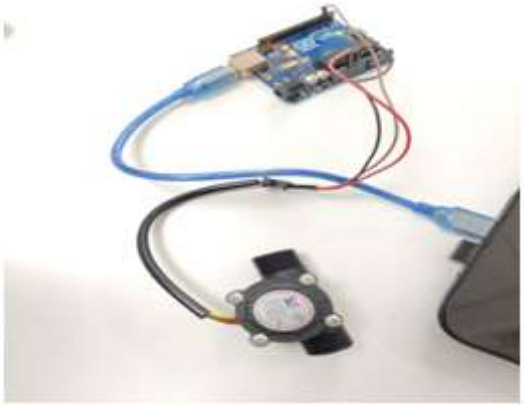

Fig- 2.2: Hall Effect water sensor with Ardiuno

C. Purity analysis and water health check-up using Ph and Turbidity Sensor.

Every building has a main tank where the water is stored and from which all of the residents in the building receive water. We intend to install three sensors in this primary tank: a turbidity sensor, a pH sensor, and maybe a temperature sensor. We'll set these numbers to a specific threshold amount, and if it's exceeded, the water quality in the tank has deteriorated, and the tank has to be cleaned. As a result, we will send notices and emails to the building's chairman, who will then take appropriate action. A smart analyser will be installed, which will activate when the water level falls below 20% of its capacity. The water flow rate will be automatically lowered, and a live runtime of how much longer water will be accessible will be communicated to all members of the building (in hours).

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Fig- 2.4: Small model of overhead water tank with all sensors embedded

D. DBMS water Bank:

Each user will be provided a predetermined amount of water and as he consumes it each day, the quantity of water intheir allotted water bank will reduce.TheDBMS water bank will assist the tracking and regulation of water usage of each individual. User can see his water usage on website/app using his login credentials.

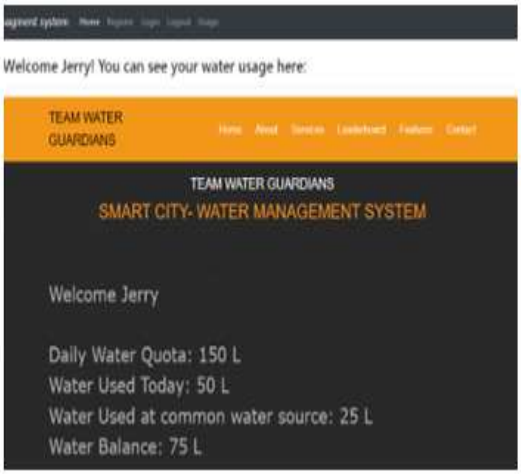

Fig- 2.5: Screenshot of water usage website

Block diagram and flowchart:

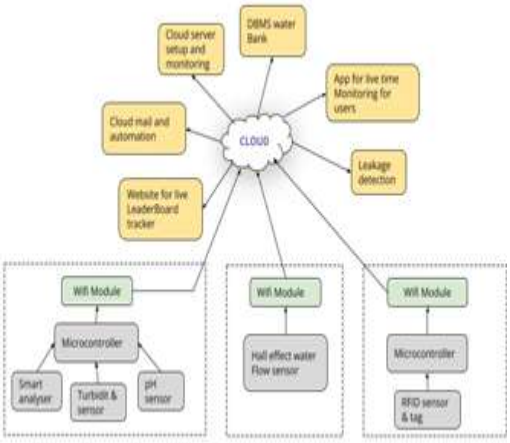

Fig- 2.6: Block Diagram

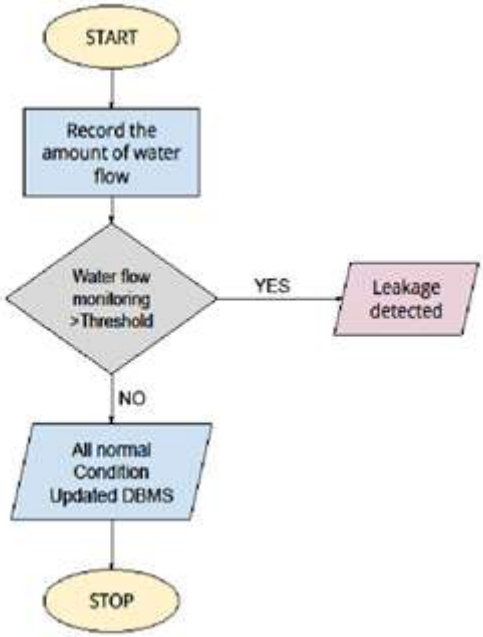

Fig -2.7: Water sensor interfacing with IOT detecting leakage of water.

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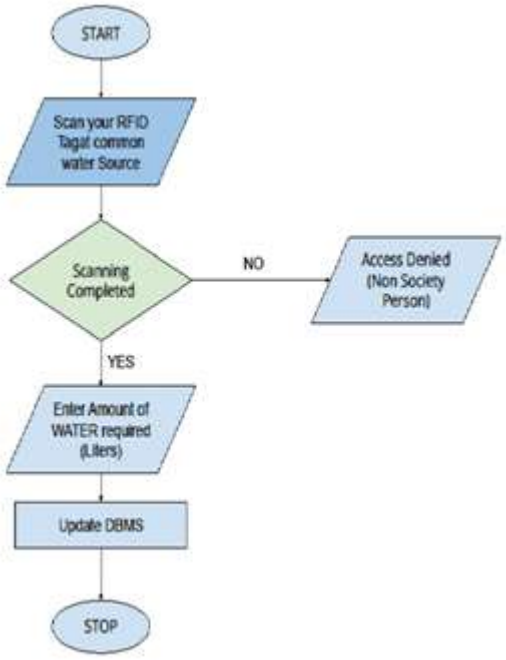

Fig- 2.8: Automation at common water source using RFID sensor.

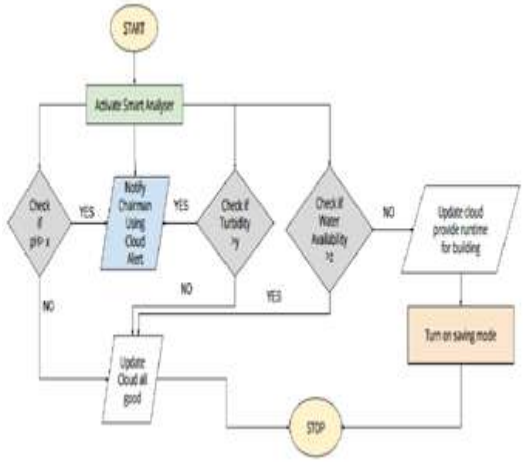

Fig-2.9: Purity analysis and water health check-up using pH and Turbidity Sensor.

III. CONCLUSION

Water tracking and management that is done properly may save hundreds of litresof water. Conserving water can help alleviate water shortages in high-demand locations.The IoT service allows for flexibility and remote monitoring of water usage and purity.This Project may grow and flourish as an essential component of society with such uniqueideas.Rapidly rising economic and population growth in metropolitan areas has resultedin increased demand for water supply expansion. Agriculture, industry, and urban areasall require clean water. Drought has also resulted in water shortages in several places ofIndia. As a result, effective water management leads to the resolution of such issues.

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