

WATER LEAKAGE DETECTION, QUALITY CONTROL AND RESUABILITY USING IOT TECHNOLOGY

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Abstract: This study aims to research on how IoT technology can be implemented in domestic sector of the water domain and how to conserve water using some telemetry sensors and actuators. In day-to-day lives water is become something essential to all the life forms, and therefore it is not foreseen that the amount of water is wasted and its consequences in the near future. Water scarcity leads to the major problems of depleting the resources available to the society. The depraved ways of wasting water in households is increasing day-day basis. In order to solve these problems, the IoT Technology can be implemented, where the water that is being used to wash hands, vegetables can be reused for the lavatory purposes. This can be achieved by taking measurements of the quality of pH in water and running it down to lavatory systems for reusability. In case the pH of water is bad, it can be disposed to sewage. Many households, have leaky or broken pipes, in order to detect the presence of leakage the two water flow sensors being input and output to water can be used to measure the flow rate and see if there is gradual decrease at the end. At given set time, a notification can be pushed to the consumer about the usage of the water on day-day basis presenting with graph of over the week on the Blynk Application. With all these solutions it requires minimum of electricity and hardware. It will be tough to implement the reusability technique if the house is already constructed and occupied

I. INTRODUCTION

"Water=Life, Conservation=Future" clarifies that water might be an asset that we utilize a day. it's what we'd prefer to endure. Leaving the fixtures on and giving up water to a waste is direct, in any case, the outcomes are obscure. The less water utilized or squandered by individuals; the less spotless water will get debased. Sometimes, utilizing abundance measures of water puts strain on septic and sewage frameworks, bringing about pollution of groundwater. Monitoring water presently permits district to get ready for proficient utilization of the water assets inside what's to come. India has been enriched satisfactory freshwater assets. Nonetheless, with a populace of 1.2 billion, high fleeting and spatial changeability in water accessibility, and over-misuse of surface and groundwater lately, the nation is confronting water shortage. In few sections this occasion is maybe having the opportunity to deteriorate inside the years to return back. As of now kind of between state debates identified with water exist. These issues are probably going to be highlighted by up-and-coming environmental change. Execution of innovations in water area can yield further more water for the moving toward future. Advancements inside Telemetry Sensors, actuators to stop loss of water in fields of homegrown and business purposes. Use of IoT technology to reuse water and monitor quality and metering with alerts and dashboard views with the help of Sensors like pH and Water Flow sensors and actuators like Servo motors to control the flaps of reusability of the water.

II. EXISTING METHODS

"Water Management System Using IoT with WSN" [1]

This paper presents an IoT gadget that makes a difference to oversee/screen and plan the use of water by noticing the degree of water in the tank. By utilizing The Web of Things (IoT), we can direct the use of water in private/workplaces. The gadget utilizes sensors to record the level of water in the tank at any moment and sends the information to the cloud utilizing Wi-Fi. The data accumulated can be perused by clients on the incorporated site utilizing their cell phone/PC gadget associated with the web. The gadget additionally controls the programmed working of water engine by turning it on when the water level lies between the low level and the significant level (the predefined range) and by turning it off when the water level falls underneath the low level or on the other hand, transcends the significant level.

"IoT based Water Distribution Control and Monitoring System" [2]

This paper canters around the layout to program water supply system to achieve ascend to the proportion of water transport to all of the characteristic environmental factors. The charging framework is a plan and created dependent on the ongoing observation of the water quantity amount in the Internet of Things. Assuming an individual neglects to cover the water bill, there is no robotized framework that can limit the water supply to their homes. The "Paid ahead of time and Post-paid Water Distribution Controller" abrogate the issue winning in the current manual cycle.

"IOT Based Water Management System" [3]

The paper studies how Industry uses water in an unexpected way. Water being a significant product is getting scant because of dry spells and abuse. Ventures don't know about their water utilization and accordingly water the board is confounded for them. This Water Management System is an answer for estimating significant mechanical water boundaries like temperature, water level and water utilization. The framework estimates every one of the boundaries continuously and can be distantly seen/controlled over PDAs utilizing Internet of Things (IOT). The framework estimates water level utilizing a capacitive level sensor. This sensor depends on the guideline of progress in capacitance because of progress in the space of the plates. It defeats the disadvantages of customary capacitive level sensor.

"Turbidity sensor for underwater applications" [4]

The paper gives the standards of activity and plan of an optical turbidity meter. The activity of the meter depends on enlightening the medium with light of chosen frequencies and estimating the backscattered light. Numerous arrangements of estimations were

made with the sensor being talked about dependent on auxiliary standard adjustment modes of Formazine. The exploratory outcomes in adjustment mediums and from real submerged applications are introduced in this paper. At long last, the presentation of the sensor framework in common-sense applications is depicted. The fundamental parts of the sensor hardware are additionally introduced.

The effect of water on any living creature is amazing. With the fast increment of the total populace, water the executives turn into a significant issue extraordinarily in mechanical, farming and different areas. The majority of individuals all throughout the planet needs drinkable water. Consistently numerous individuals are experiencing different lethal illnesses brought about by water contamination. Across the world, there keep on being tremendous volumes of wastewater siphoned straightforwardly into waterways, streams, and the actual sea. The effect of this is extreme – besides the harm to the marine climate and to fisheries it can cause, it does little to save water when many are anticipating that a worldwide deficiency is around the bend. The interest for new clean water conveyed to our homes is truly expanding as an ever-increasing number of private homes are being set up. Most of the work done around water management, is more into measurement and quality analysis, but doesn't factor the issues of water scarcity where it can be solved by implementing sensors for leakage factors and usage monitoring with alerts to hand held devices.

III. PROPOSED METHOD

The proposed method includes of sensors and actuators to achieve the solutions to the problems. The water flow sensors can be attached at the main input of the water and also to the output of water pipe. Readings at the input and the output flow can be taken, if the water flow rate has a significant difference between the input and output pipes then there is a leak between the pipes and also the consumer can be notified with the usage of water on daily basis. With the sensors like pH and Turbidity, quality can be measured where if the pH quality and turbidity readings are significant the water can be used for lavatory systems such that the water is used reused. All these components can be connected to a Raspberry Pi device and can be monitored over dashboards like Blynk

pH sensor: The pH of an answer is the proportion of the causticity or alkalinity of that arrangement. The pH scale is a logarithmic scale whose reach is from 0-14 with an impartial point being 7. Qualities over 7 demonstrate an essential or antacid arrangement and qualities under 7 would show an acidic arrangement.

Turbidity sensor: Turbidity is a proportion of the darkness of water. Turbidity has demonstrated the degree at which the water loses its straightforwardness. It is considered as a decent proportion of the nature of water. Turbidity shut out the light required by lowered amphibian vegetation. It additionally can raise surface water temperatures above typical on the grounds that suspended particles close to the surface work with the ingestion of warmth from daylight.

Stream sensor: Flow sensor is utilized to quantify the progression of water through the stream sensor. This sensor essentially comprises of a plastic valve body, a rotor and a Hall Effect sensor. The pinwheel rotor turns when water/fluid courses through the valve and its speed will be straightforwardly corresponding to the stream rate.

Servo Motor: It is utilized to control the flaps internally to shift water to sewage or reusability purposes.

Raspberry Pi 3: The Raspberry Pi is a minimal expense, Mastercard measured PC that plugs into a PC screen or TV, and utilizations a standard console and mouse. It is a fit little gadget that empowers individuals, everything being equal, to investigate processing, and to figure out how to program in dialects like Scratch and Python. It can do all that you'd anticipate that a desktop computer should do, from perusing the web and playing superior quality video, to making bookkeeping pages, word-handling, and messing around. With Blynk, you can make cell phone applications that permit you to effortlessly communicate with microcontrollers or even full PCs like the Raspberry Pi.

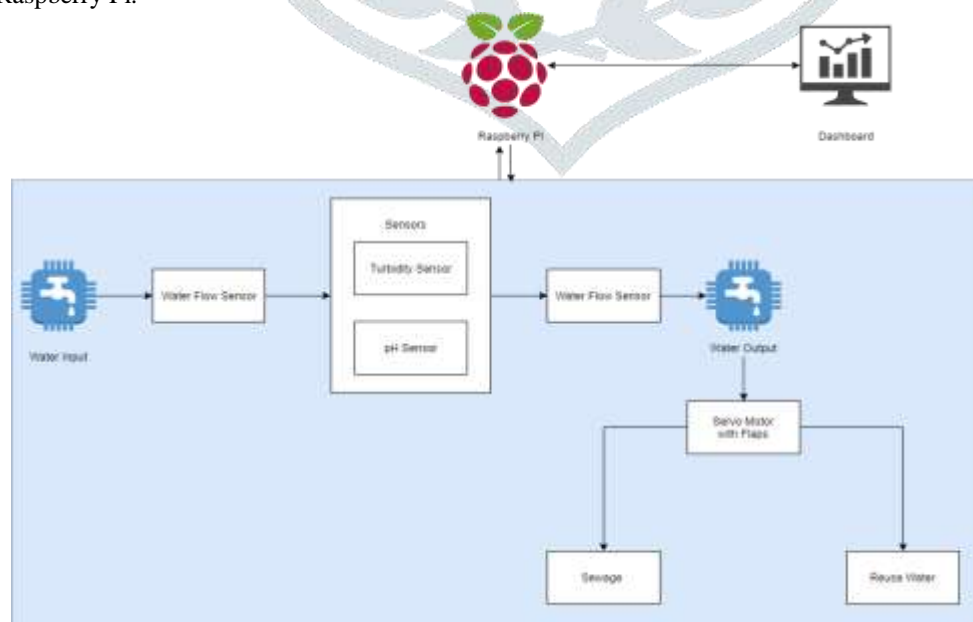


Figure 1: Block diagram for the concept

IV. TOOLS AND TECHNOLOGIES

IoT tools and technologies that include sensors and actuators with some hardware essentials can put the effort of bringing a new system that entitles to conserving water.

The Raspberry Pi is an extremely modest PC that runs Linux, yet it likewise gives a bunch of GPIO (universally useful information/yield) pins, permitting you to control electronic segments for actual figuring and investigate the Internet of Things (IoT). Raspberry Pi to figure out how to code, and individuals who would already be able to code utilize the Pi to figure out how to code hardware for actual ventures. The Raspberry Pi can open freedoms for you to make your own home robotization projects, which is mainstream among individuals in the open-source local area since it places you in charge, instead of utilizing a restrictive shut framework.

Turbidity, a proportion of shadiness in fluids, has been perceived as a basic and fundamental marker of water quality. It has been utilized for checking drinking water, including that created by filtration for quite a long time. Turbidity estimation includes the utilization of a light pillar, with characterized attributes, to decide the semi-quantitative presence of particulate material present in the water or other liquid example. The light shaft is alluded to as the occurrence light pillar. The material present in the water makes the episode light shaft disperse and this dissipated light is identified and evaluated comparative with a discernible adjustment standard. The higher the amount of the particulate material contained in an example, the more prominent the dispersing of the episode light pillar and the higher the subsequent turbidity.

A pH sensor is quite possibly the most fundamental devices that is ordinarily utilized for water estimations. This kind of sensor can quantify the measure of alkalinity and acidity in water and different arrangements. When utilized accurately, pH sensors can guarantee the security and nature of an item and the cycles that happen inside a wastewater or assembling plant. As a rule, the standard pH scale is addressed by a worth that can go from 0-14. At the point when a substance has a pH worth of seven, this is viewed as nonpartisan. Substances with a pH esteem over seven address higher measures of alkalinity while substances with a pH esteem that is lower than seven are accepted to be more acidic.

Water stream sensor comprises of a copper body, a water rotor, and a corridor impact sensor. At the point when water courses through the rotor, rotor moves, its speed changes with various pace of stream. What's more, the corridor impact sensor yields the comparing beat signal.

A stepper engine is an electromechanical engine that proselytes mechanical force from the given electrical information power. There are three sorts of stepper engines [5], for example, factor hesitance stepper engine (VR) ii) perpetual magnet stepper engine iii) Hybrid stepper engine. A variable hesitance stepper engine enjoys numerous benefits like no lasting magnet, no cogging force, and high venturing ability.

V. CONCLUSION

This paper describes how IoT Technology can be used to implement in domestic water sectors in order to save water and gain reusability. Proposed method will be providing efficient and reliable procedures to solve the problems of water conservation and avoid wastage of water. With the given frameworks, problems of water scarcity can be decreased. Society fails to recognize the internal problems of earthly resources, water being the most important one. The frameworks can help in every way to reduce the water wastage at most and bring outcomes in reusability. he proposed solution would work very well with right engineering and implementing the right technology stack. Hardware or plumbing also matters to the very concern of the framework. This framework can be evolved in future to also detect leaky taps and make the water leakage detection better by implementing pressure sensor and gauges.

REFERENCES

- [1] Savita Lade, Prathamesh Vyas, Vikrant Walavalkar, Bhaiyasab Wankar,Pranjal Yadav, "Water Management System Using IoT with WSN,"International Research Journal of Engineering and Technology, vol. 5, no.3, pp. 3079-3082, March 2018.
- [2] K. S. Chandwani, Abhaya Gulhane, Neha Mahakalkar, Rasika Shivhare, Payal Mankar, "IoT based Water Distribution Control and Monitoring System", International Journal of Research in Engineering, Science and Management Volume-2, Issue-9, September-2019
- [3] V. Jeurkar, M. Inamdar, P. Kale, A. Khandelwal, S. Daware and R. Patel, "IOT Based Water Management System.," 2020 International Conference on Industry 4.0 Technology (I4Tech), 2020, pp. 141-144, doi: 10.1109/I4Tech48345.2020.9102686
- [4] S. Mylvaganaru and T. Jakobsen, "Turbidity sensor for underwater applications," IEEE Oceanic Engineering Society. OCEANS'98. Conference Proceedings (Cat. No.98CH36259), 1998, pp. 158-161 vol.1, doi: 10.1109/OCEANS.1998.725727.