

Water Monitoring and Management System with IOT

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ABSTRACT: During the earlier decade, water requirements have extended whimsically in India. Growing solicitation of water effortlessly has become a critical test for the world. Wasteful utilization of water, climatic changes and Urbanization has also depleted the advantage. In this paper, we present an IoT structure for water watching and control approach which supports web set up data grouping regarding ceaseless bases. We moreover calculate the idea of water appropriated to every nuclear family by sending pH, conductivity, Turbidity, water flow sensors. The standard water metering scheme necessitate episodic person mediation for upkeep making it severely planned and normally least convincing for deficiency of the present replica for an inescapable utilization of remote systems for smart quality checking and give data remotely. This manuscript there an IoT gadget which assists with overseeing and map the use of water.

KEYWORDS: Internet of Things (IoT), Water Management, Water Quality, Data Analysis.

I. INTRODUCTION

In the 21st century, there were lots of advancements, but then were defilements, a risky barometrical deviation, and so forth are being confined, considering this there is no secured consumption water for the world's sullyng. Nowadays, water excellence watching dynamically faces challenges because of an Earth-wide temperature supports limited water resources, creating masses, etc. Thusly there is requirement of mounting improved procedures to screen the water superiority parameters continuously. The checking of water excellence is critical for keeping up the security of water assets utilized for different purposes for example, drinking, amusement, or food preparing. Reconfigurable smart water quality monitoring system in IoTenvironment[1].Water excellence is controlled by associated compound, bodily, and microbial elements, including however not restricted to pH, turbidity, conductivity and water level in the tank. Water is one of the most significant essential prerequisites for each living being, anyway tragically, a huge proportion of water is being exhausted by virtue of abandoned use and abuse of water resource. So in this manuscript, we tackle all the over notice subject with automatic water management recognition and topping off of water store structure with the help of Internet of belongings (IoT)Internet of things enabled real time water quality monitoring system[2]. To guarantee the shielded deftly of drinking water the excellence should be checked dynamically thus new philosophy IOT(Internet of Things) based water excellence watching has been planned. In this project, we will execute the arrangement of IoTbase water excellence checking system that screens the idea of water continuously. This system includes a couple of sensors which will calculate the water superiority limitation. The continuous checking of water capital information will advantage the water capital the official separation and open the basic thought of steady IoT based water capital information scheme is to give total and careful knowledge. The structure is made during describing some unequivocal water reserve constraint by then, Water height and stream parameter are portrayed for water measure and the administrators, trailed by a sensor organize water capital in rank checking is fabricated subject to IoT.

II. EXISTING SOLUTIONS

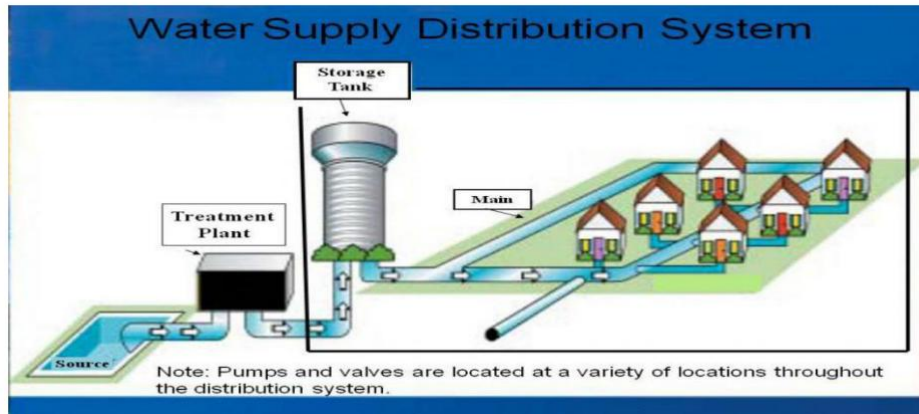


Fig. 1 Conventional water system

So basically, there is a particular time during which the water supply is provided to all the houses in a locality, which is usually in the morning. The residents then fill up their share of water in the tanks built at their houses, to utilize that amount of water for the entire day. These tanks are then connected to taps, toilets, kitchen etc. This is a daily cycle and is repeated every day.

The major disadvantages of this system are that, there is no control over how much water is stored by every house, as the size of the tanks in each house will be different. Houses with bigger tank might use an amount of water which is more than required causing inefficiency in water management, with no way of controlling it. Due to this, it becomes very difficult to make a track of usage of water at a larger level.

III. PROPOSED LAYOUT

We present an IoT structure for water watching and control approach which supports web set up data grouping regarding ceaseless bases. The system watches out for new challenges in the water zone - stream rate evaluating and the prerequisite for an examination of the deftly water in arrange to control water expenditure and bolster its insurance. We moreover calculate the idea of water appropriated to every nuclear family by sending it through pH, turbidity, and conductivity sensors. As our water will pass through all the three sensors and if the measures are within the range the valve of solenoid one will allow the flow of water to major tank, once the major tank level is measured the water level sensor it will stop the flow through solenoid one. All the data and readings will be monitored on the cloud server (ubidots) and if any measure fails then a notification will be popped up to the device.

Once the water needs to be distributed to further tanks it will flow through the solenoid two and to measure the amount of water being distributed is calculated by flow sensor. If the water level exceeds for any particular family, the solenoid two will automatically stop the supply and hence we can keep a strict monitoring on water management and conserve it for future and hence we have designed a low-cost autonomous water quality monitoring system[3]

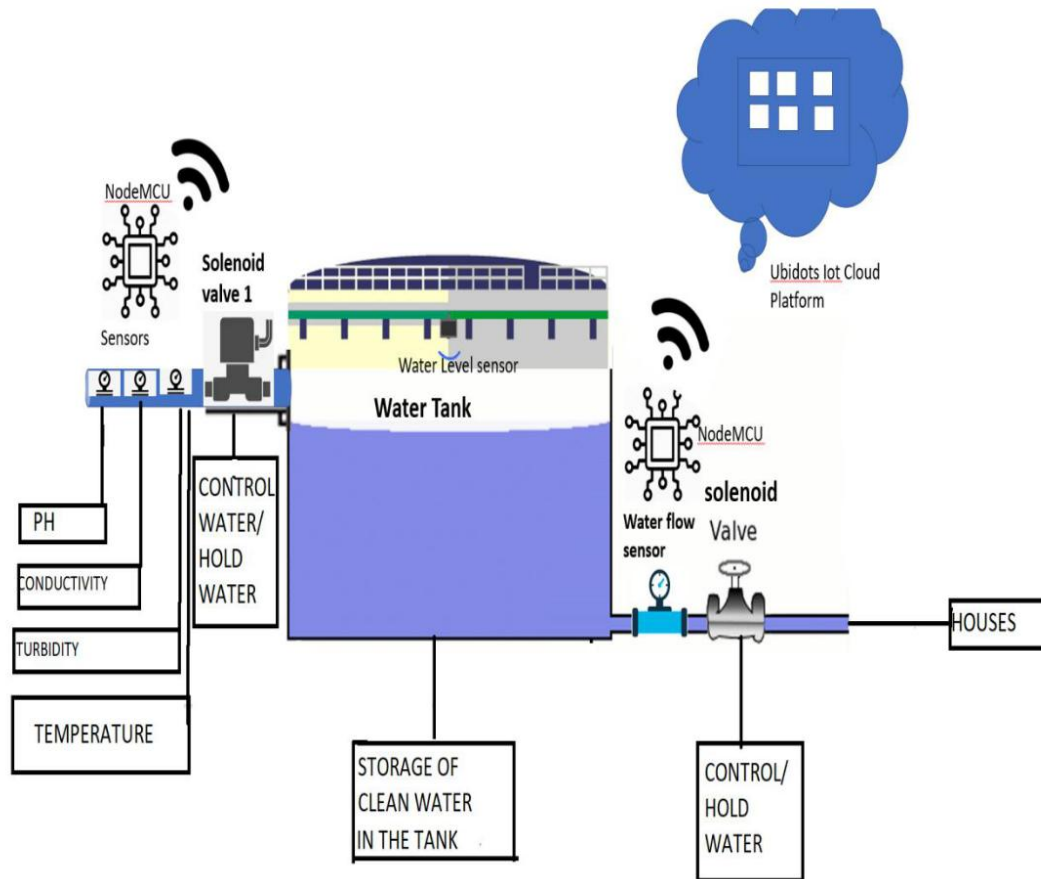


Fig. 2 Working of project

IV. COMPONENTS USED

Force gracefully

In this framework, we need a force gracefully of 3.3 volts for Arduino board. Force Supply of 5 volts for pH sensor, Conductivity sensor, the water level sensor/ultrasonic sensor, water stream sensor and turbidity sensor and Wi-fi module. 12 volts for water solenoid valve.

Microcontroller

The ArduinoUno is exploited as a microcontroller in this structure, it has fourteen higher knowledge acquiesce brooch of which we are exploiting 6 pins for connecting sensors-pH, conductivity, ultrasonic, Water stream rate and solenoid valves, and can be make use of as PWM yields, a USB connection, a force jack and a rearrange badge is similarly there. We are interfacing Wi-Fi unit ESP8266 for giving it a web-based methodology



Fig. 3 Arduino Uno

pH meter

The Ph gauge is utilized for the excellence ensure if water is alright for consumption. A decent pH height is significant for person wellbeing; it ought to be around equivalent to seven. We are utilizing ETP306 as it is minimal and even can be set in daylight. It gives Full range pH perusing from one to fourteen. It gives a Single perusing and ceaseless understanding modes.



Fig. 4 pH sample

Conductivity Sensor

Electrical conductivity is additionally a marker of water excellence. It quantifies gratis chlorine devoid of test pretreatment. It does not have muddled and costly reagents required. Conductivity information can distinguish contaminants, decide the centralization of arrangements, and decide the immaculateness of water. It is Compact in size. Conductivity sensor estimates conductivity by AC voltage applied to nickel terminals. These cathodes are put in a water test and perusing is acquired.



Fig. 5 Conductivity sensor

Water level sensor

Water level sensor will assist us with choosing if we have sufficient amount of water to be provided. In the event that the tank is unfilled water stream and an excellence ensure will be waiting and on the off chance that the tank is full, at that point, water can be dispersed following a excellence check. Ultrasonic sensor HC-SR04 is utilized to gauge separation in the scope of 2cm-400cm with a precision of three mm. The ultrasonic sensor module takes a shot at the normal marvel of echo of sound.

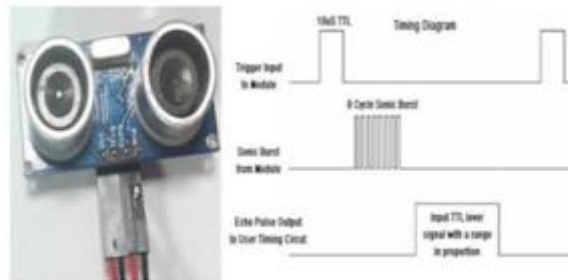


Fig. 6 Water level sensor

Water stream sensor

For proceeds, water stream rate estimation YF-S201 is utilized. Associations required for this stream rate sensor as for Arduino's is insignificant. It has working temperature scope of - 25°C to +80°C which is wide enough for our application to work effectively.



Fig. 7 Water stream sensor

Water controlling valve

A solenoid regulator is utilized as a water scheming regulator, it is a basic electromagnetic gadget that modify over electrical vitality straightforwardly into straight automatic movement. A solenoid regulator is the blend of a mechanical regulator and fundamental solenoid. So, a solenoid regulator has two sections specifically Electrical solenoid and an involuntary regulator. Solenoid changes over electrical vitality to mechanical vitality which works a mechanical valve that is to unlock, shut or to alter in a place.



Fig. 8 Water controlling valve

Turbidity sensor

The Arduino turbidity sensor SEN0189 detects water quality by measuring level of turbidity. It is ready to detect suspended particles in water by measuring the sunshine transmittance and scattering rate which changes with the quantity of total suspended solids (TSS) in water. Its Operating Temperature: 5°C~90 °C As the TTS increases, the liquid turbidity level increases. This Arduino turbidity sensor have both analog and digital signal output modes. You can select the mode consistent with the MCU as threshold is adjustable in digital signal mode. Turbidity sensors are often utilized in measurement of water quality in rivers and streams, wastewater and effluent measurements, sediment transport research and laboratory.



Fig. 9 Turbidity sensor

Wi-Fi module

After every one of the strictures are estimated and checked the data must be send on the web with the goal that it very well may be observed distantly. For this reason, Wi-Fi unit is utilized. It causes us to make this framework constant. The ESP8266 Wi-Fi unit is a self-governing SOC with included TCP/IP meeting heap that can provide any microcontroller admission to your Wi-Fi systematize. The ESP8266 is able to do moreover offloading Wi-Fi systematize ability from one more application computer or facilitating an application.



Fig. 10 Wifi module

V. METHODOLOGY

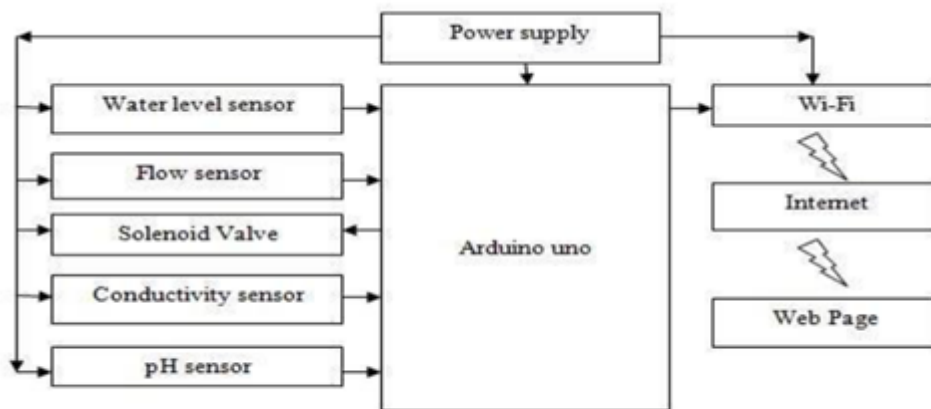


Fig. 11 Framework

A stand-alone system is set up at the water source, in this case, the water tank in every house of a society is considered. This system will contain sensors and a micro controller like Arduino, power supply, etc. The sensor will measure parameters like pH level, amount of water flowing out, turbidity of water, conductivity of water and an assessment of water quality parameters: a review[4] more quality analysis. Using available programming platforms (C on Arduino) this system will be programmed to monitor the management of water. Through regular survey, a specific amount of water measured will be set as the Daily usage level. When the amount of water used exceeds the daily usage levels limit, the respective individual will be alerted through email and phone notifications, this could be achieved by using online platforms like ubidots. If the person fails to respond within the time constant, the system will alert the manager. By using IOT cloud platforms (ubidots) this data of overuse of water. could be stored and the manager/the person in charge could retrieve this data anytime, anywhere. This system will also be programmed to alert the person in charge in case of damaged pipes/leaks. An electric ON/OFF switches will be installed as a part of this IOT system which can receive commands from the house owner and can be controlled by his/her smartphone. In this way, setting up an IoT ecosystem will help create an optimized and efficient water distribution system at a personal level. The system installed and maintenance cost will be moderate.

VI. RESULTS

An internet-based approach to measuring water quality and delivery systems on a real-time basis. The results of the varied parameters of water quality are verified that the system achieved the reliability and feasibility of using it for the monitoring purposes. In our proposed system, water level can be monitored continuously from anywhere using web browser or the application. This Project the flow, turbidity, conductivity and ph. sensors which provide more accurate and calibrated information for water level in tank. Figure 14 also justifies the gradual decrease in usage of water and hence there is a proper management of water taken in the place, as we have installed all the sensors for quality inspection the water distributed is safe for all the multipurpose use and it also identifies the leakage as well. All the real time data will be reflected in dashboard created on ubidots as following in figure12.

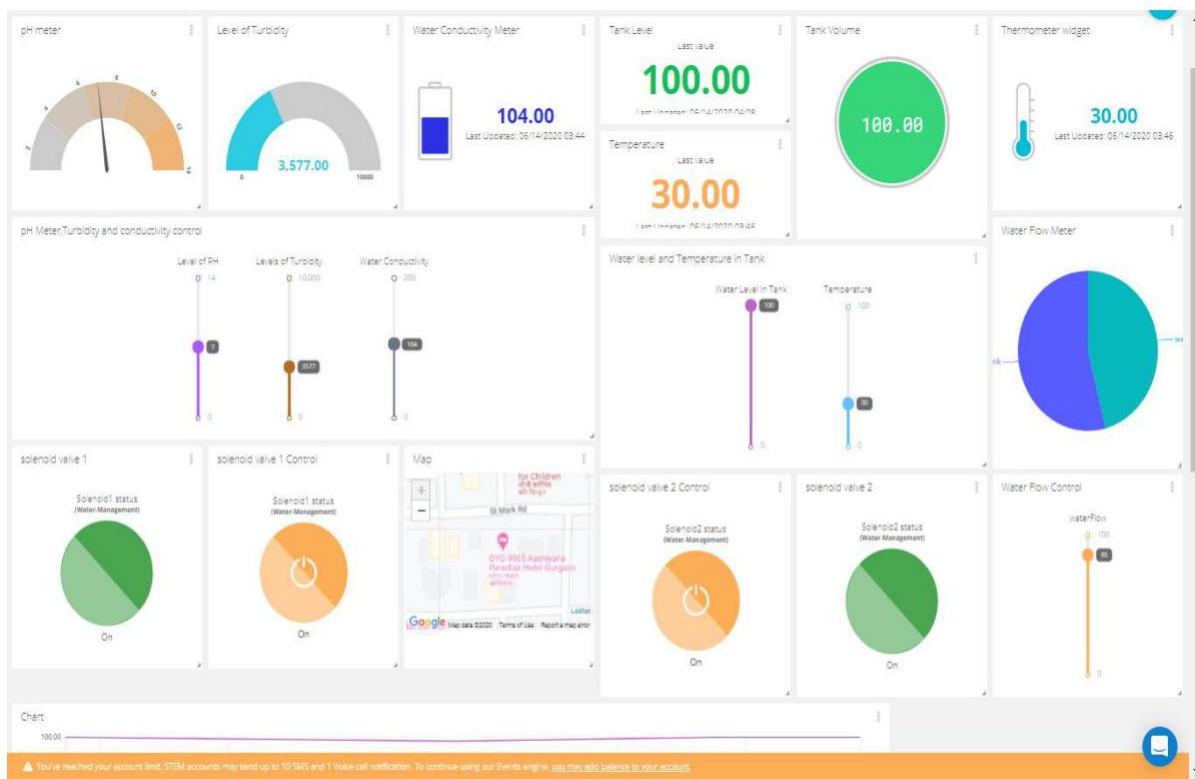


Fig. 12 User interference of Ubidots



RESULTS ANALYSIS								
PARAMETERS	REAL TIME DATA RESOURSE							
	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8
PH	7	7	8	7	7	7	7	7
TURBIDITY	3563	3500	3577	3552	3597	3586	3574	3561
CONDUCTIVITY	104	106	104	110	104	105	106	102
TEMPERATURE	30	28	27	29	35	31	28	27
SOLENOID 1	ON	ON	ON	ON	ON	ON	ON	ON
WATER TANK	100	98	100	100	99	100	99	100
SOLENOID 2	ON	ON	ON	ON	ON	ON	ON	ON
WATER FLOW	75	85	80	70	67	67	63	62

Fig. 13 RESOURCE PARAMETERS AND PROPERTIES

Demonstrating of the dissemination framework was done dependent on a participatory methodology considering factors like ampleness and dependability, reasonableness, natural maintainability, and money related supportability Indices. A couple of the significant parameters gathered for building up the IoT framework are referenced in Figure13.

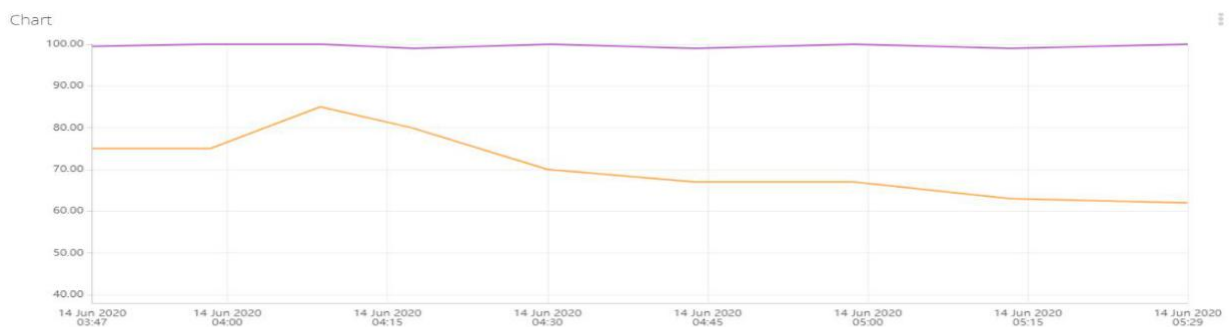


Fig. 14 Graph obtained from Ubidots

Figure14 also justifies the gradual decrease in usage of water and hence there is a proper management of water taken in the place, as we have installed all the sensors for quality inspection the water distributed is safe for all the multipurpose use and it also identifies the leakage as well.

VII. CONCLUSION AND FUTURE SCOPE

This paper has shown the fruitful execution for practicing consumption monitoring to optimize and keep in check the usage of water resources at different levels. Also reflect the real-time monitoring and the ability to immediately address detected issues. It also improves water quality and stop contamination by chemical waste and natural pollution like acidification. Hence it enhances the efficiency of water systems and also eradicates the manual reading and management of water. This is a web-based way to deal with estimating water quality and use consistently. A stream sensor for estimating of amount provided, disposing of the downsides of customary water metering frameworks.

Future improvements can incorporate prepaid charging and programmed treatment of water dependent on the idea of sullyng. Our rule objective was to design a sharp system for resembling the water management in the tank and prevent overflow or inspect the water use. This separating component can in like manner aid us in finding whether there is any spillage in the tank or not.

The system will be created later on involving increasingly number of hubs to broaden the inclusion go. In our planned framework, water management can be checked persistently from anyplace utilizing internet browser and cloud-based application Ubidots. Sensors can be forbidden naturally full brilliant robotization is accomplished. It is a powerful structure and small in dimension. This scheme utilizes ultrasonic sensor, flow sensor, level sensors which give increasingly precise and aligned data for water level in tank. The difficulties while building up a framework for the rustic set up was multi-faceted. Absence of education, absence of mindfulness and advanced partition winning in the country segment must be gone up against. Aside from these, building up a framework for the low asset arrangement was likewise handled. We have built up a framework that will lessen human intercession in water the board which is versatile in both the urban and provincial situations fusing the manageability factor.

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