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Smart Drinking Water Management Based On IOT

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ABSTRACT: This project presents an IOT device which help to manage and plan the usage of water. This system can be easily installed in residential societies. Sensors placed in the tank which continuously informs the water level at the current time. And to identify the contamination of water in water tank and stopping the motor before the water distributed to consumers. And also sent notification to the motor man and higher authority of corporation members about the contamination of water in a particular area.

KEYWORDS: IoT, Management, Contamination, water tanks.

I. INTRODUCTION

Water is one of the most important basic needs for all living beings, but unfortunately, a huge amount of water is being wasted because of uncontrolled use and exploitation of water resource. Kerala averages rainfall of 3,000 mm a year. The general impression was that among all the states in India, Kerala had ample drinking water, but it's not the case. There are 1,164 problem villages without the adequate supply of drinking water. Even though Kerala has 44 rivers spanning its lush green landscape. Together, they contribute an annual discharge of 72, 00 million cubic meters of water which is unused to the Arabian Sea. One of the main reasons for the shortage is poor management of water.

Overflowing water tanks in residence, schools, colleges, Municipal overhead tanks, Hospitals etc. can contribute to the massive amount of water wastage. If we can control this we can save large amounts of water.

Conventional water tanks can neither monitor nor control the water level in the tank. As of now, the water level has to be manually checked and refilled according to the requirements.

So we solve all the above mention problems with automatic water level detection and refilling of water storage system with the help of Internet of Things (IoT). Water, once an abundant natural resource, is becoming a more valuable commodity due to droughts and over use. Water management is the activity of planning, developing, distributing and managing the optimum use of water resources. Indian heritage had detailed planning and distribution of water resources using the natural and artificial channels. In the modern day of water distribution system has network of water tanks to regularize and distribute the water resources to the civilization This situation is the result of natural circumstance and human activity. Due to the unknown of the pressure of water flowing through the pipe, there are chances to have damage to pipe and start to leak on the damage part, when distributing to the consumers. The distributors are not easily identified when there is an leakage of the resources while distributing. .

II. PROBLEMS OF WATER RESOURCE

1. An increase and exacerbation of sources of contamination. Alterations of the sources of water resources with scarcity and decreased availability increased vulnerability of the human population due to contamination and difficulty of access to good quality water.
2. Access to clean water and adequate sanitation has been a challenging issue..

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III. PROBLEM STATEMENT

1. Leaking Water Tank Problems

Leaking Overflow on tank.A leaking overflow on the tank is a common cause of a faulty ball cock which is also known as a float operating valve part 1 or part 2. A cheaper way to fixing a float operating valve is by replacing the valve but in some cases as experienced, the valve is then weaker and no longer under manufactures guarantee. To get a complete guarantee it is always best to get a plumber to replace the valve so that it is up to the latest british standard and will not be a problem in the close future

2. Leaking water tank hole.

If you find that your leaking water tank is leaking at the inlet valve hole then in most case this is because the overflow is not to the correct height or may even be not level. Another reason can be that the water pressure is that high the overflow can't take the pressure. If this is the case then this become a job for an emergency plumber and to complicated as either a pressure reducing valve is required or the tank and the support needs replacing.

3. leak at Isolation connecting to ball cock also know as the float operating valve.

In some cases when you find a leak at the Isolation valve connection to the ball valve, it is the fibre washer or the ball washer within the Isolation valve. Most commonly it's going to be the fibre washer which by turning the Isolation valve off with a flat headed screw will Isolate the water so that you can replace the washer. Unfortunately by turning the Isolation valve off in some cases is the reason for the leak which then will need a replacement by turning off the mains waster stopcock.

4. Leak at pipe work near water storage tank.

A leaking pipe near the water tank is most cause by the cold weather due to the location, the only way this is normally dealt with for any problems and cured is to first make sure all pipe is fully lagged and not open to the air. The more spent on lagging the better chance that will not be paying more in the future for the amount of damage that the cold weather will cause. Other reason for leaking pipes are knock and wear and tear due to age. It is very important when the plumber has fitted the pipework that the pipes have been fully cleaned.

5. Split leaking water tank.(sectioned tanks)

If you find you have a split in your tank and want a temporary fix then the only action to tank may be fixed by using a silicone called the Plumbers Gold. This is a new silicone that was developed in 2013 just for plumber when requiring silicone to stop the leaking underwater and also setting, again under the water

6. Water leaking from pipe going over tank.

If you find you have water leaking from the pipe that goes over the tank this may either be due to bad central heating maintenance commonly by so called DIY plumbers or the over heat stat is not working on the central heating system and the water is venting out. For the type of leaking water tank problem and cured the only thing to to is replace the thermostat which you may need either a Gas Safe Register engineer or a plumber depending on the location of the central heating stat

7. Leak coming from joint of outlet from tank.

If you find a leak at the pipework connection to the water tank then you will need to drain down the tank fully and inspect. The problems may be cause by with age, knocking or the storage tank has over heated and the tank has started to bulge causing a bad form on the tank. The only type of cures for the water tank is for it to be replaced completely by a fully qualified plumber.

8. Leaking gate valve

The leaking gate valve is either cause by a fibre washer going due to a weakness which can also be cause by age or the gland is leaking due to maintenance in other areas. Unless you are very skilled you may need an emergency plumber to solve this or you may need to partly drain down the central heating or the hot water system. In most cases, it is always better completely replace the gate valve than repair due to the valve furring up and unable to get a complete stop on any water passing through.

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9. RUSTING(CORROSION) OF PIPES

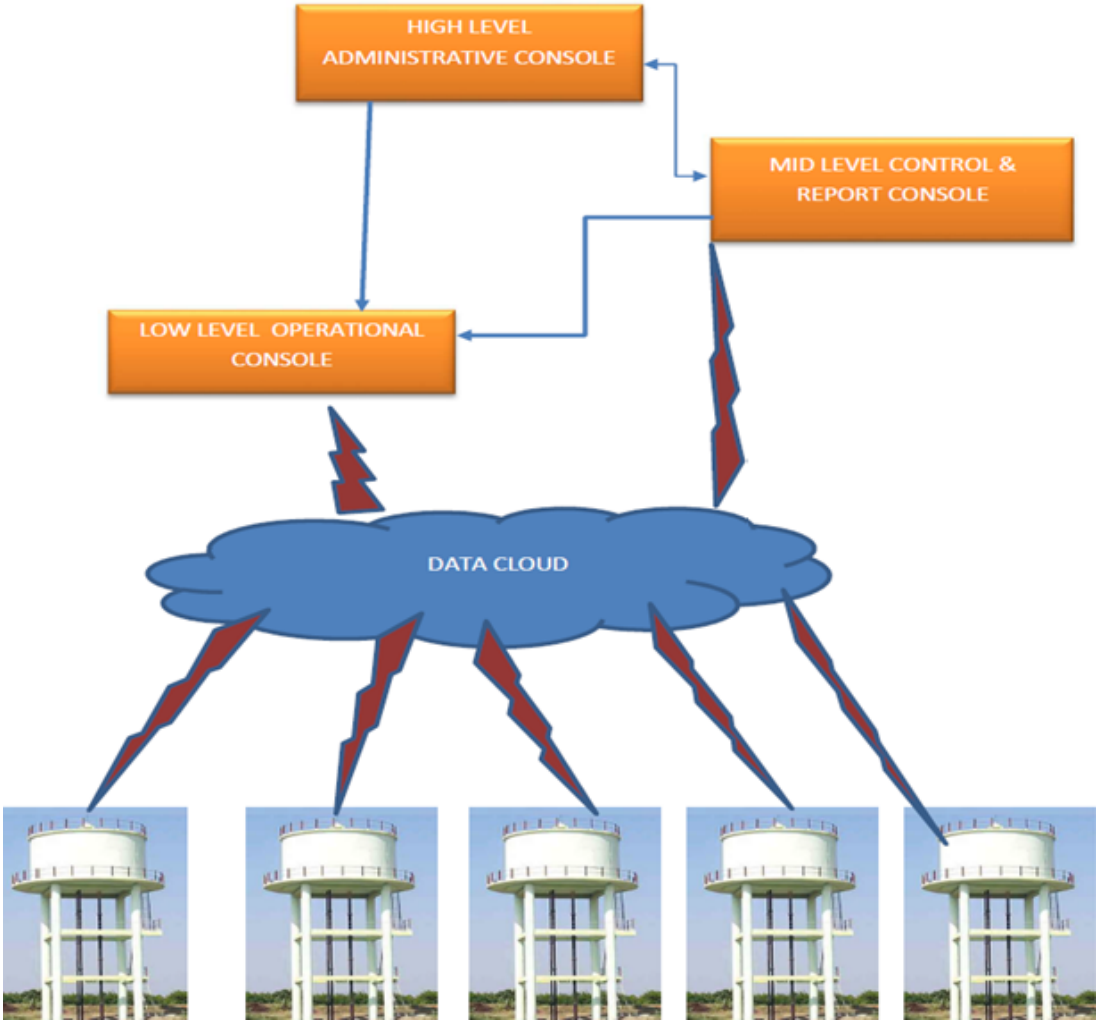
DUE TO ATMOSPHERE:RAIN WATER LEAKAGE ABOVE THE TANK ROOF IN METAL DOOR.COVERING USING UMBRELLA SHEET AND DOCTOR FIX IT, KRYPTONITE. QUALITY OF WATER WILL REDUCED DUE TO TEMPERATURE VARIATION.

10. DUE TO LIVING ORGANISMS

TAKING BATH INSIDE THE TANK. FORGOT TO CLOSE THE DOOR AND IT LEAD TO SEVERAL DEPOSITION OF DUST AND BIRDS WASTE(MOSQUITO). MISUSING THE WATER TANK AS A SWIMMING POOL.

BASIC CONCEPT

Here is a Water Management System using IoT. Water level indication, automatic water pump on/off, etc are carried out by this project.



LOW LEVEL CONSOLE

The Low Level Console is an electromechanical module which sends the control signals for motor control and sequencing of water supply to multiple water tanks. This reduces the burden of managing the multiple water tanks by the operator. The console will have a remote mode for controlling through the web based application for any intermediate requirements/decisions by the Midlevel control and report console or higher admin console. The main objective of this control is to regulate the water supply and controlling the motors from one common location. This will be electronic module with remote control facility. An optional debug/control monitor port will be provided to monitor the data during maintenance.

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MID LEVEL CONTROL AND REPORT CONSOLE

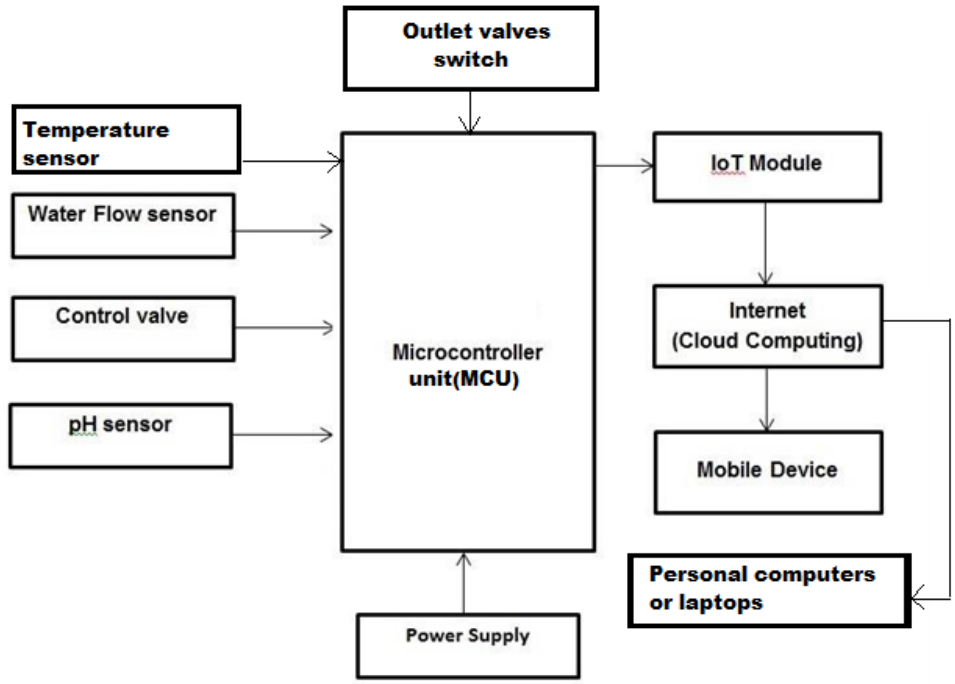
The mid-level console generates the report from the multiple sensors which measures the water quality and the contamination levels. The reports are sent to higher level admin console for actions, whereas in emergency the Mid-level console has the authority to shutdown or take the control of the low level console. The main objective of the console is to control the quality of the water supplied. The periodical report is maintained in cloud and access to the entire officials. This will be computer based application with web based control to low level consoles.

HIGH LEVEL CONSOLE

The higher admin console has the authority to access and control all the mid-level and low level consoles. Monitoring of the mid-level reports and action required to be taken based on the water quality levels will be displayed in the higher admin console. The operator takes the decision based on the suggestions provided by the application. The main objective of the console is to generate the reports of the water grid and actions required. This will be computer based application with web based control to mind and low level consoles.

PROPOSED METHOD

Here we are using a seperate microcontroller unit instead of using a Atmega328 for the main purpose of optimizing the existing system and also we using military level components and techniques to reduce the power consumption. The pH sensor is the capability of measuring ppm, Tdm, and also the pH values. pH sensor can measure temperature also. In order to control the whole system at anywhere through internet we using ESP8266 Wi Fi module and GSM module for sending notification purpose



TRANSMITTER SECTION

The transmitter section consists of an Arduino, HC12 transmitter, laser sensor, and NodeMcu. In the automatic water level detection and refilling of water storage system, the sensor used is Laser sensor which is a replacement of ultrasonic sensor because of its accuracy and small size. The Laser sensor is used to detect the water level. The Laser sensor is placed above the tank which continuously monitors the water level in real time. This information will be updated in the cloud and user can analyze the amount of water. These sensor values are sending to water pump via the HC12 transmitter to turn on/off the pump.

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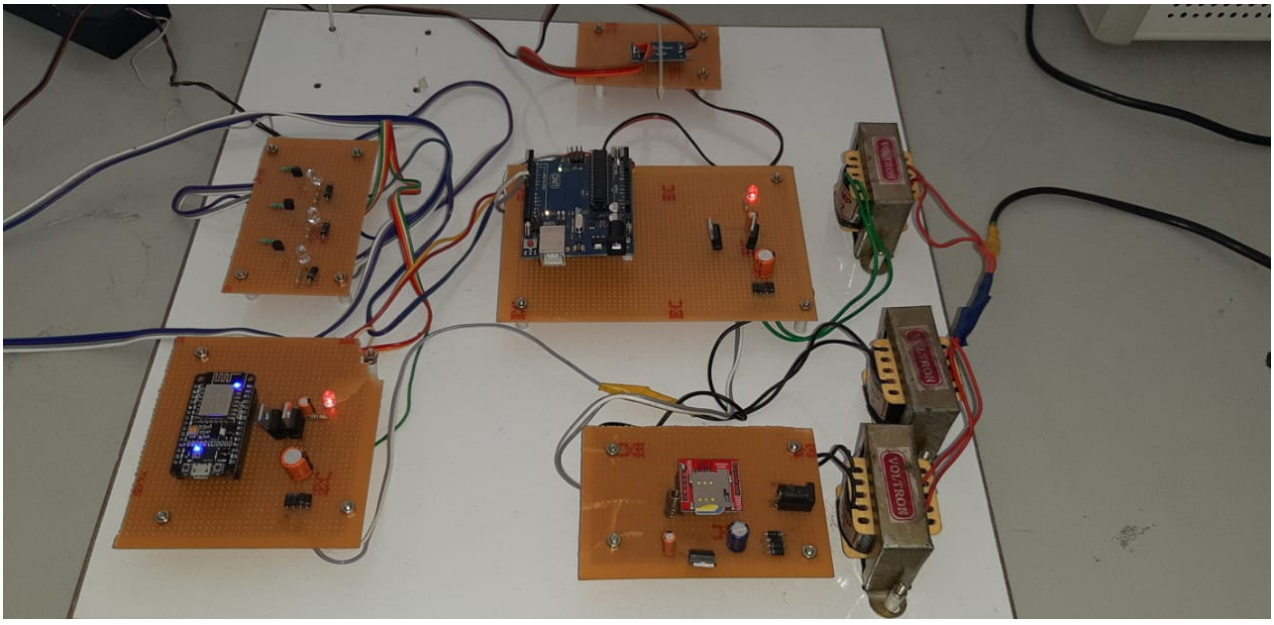
The sensor values are also forwarded to NodeMCU which is used for the IoT purpose. NodeMCU connects the system to a cloud storage. Here we use Adafruit cloud platform. The platform is designed in such a way that it will show the instantaneous value of current status of water. The water level measured by sensors is sent continuously to NodeMcu and forwarded to Adafruit cloud, it gives a graphical representation of water level from which we can analyze our water usage.

RECEIVER SECTION

The receiver section consists of Arduino Uno, relay, HC12 receiver and a motor. According to the value received from the sensors about water level to HC 12 receiver, the motor will automatically turn on/off to pump the water to the tank

.

SI NO:	Conditions of water level	Motor status
1	When the water level is below a minimum level.	ON
2	When the water level is above the maximum level.	OFF
3	When the water level is in between maximum and minimum level.	It can be controlled by a user using Adafruit cloud platform.



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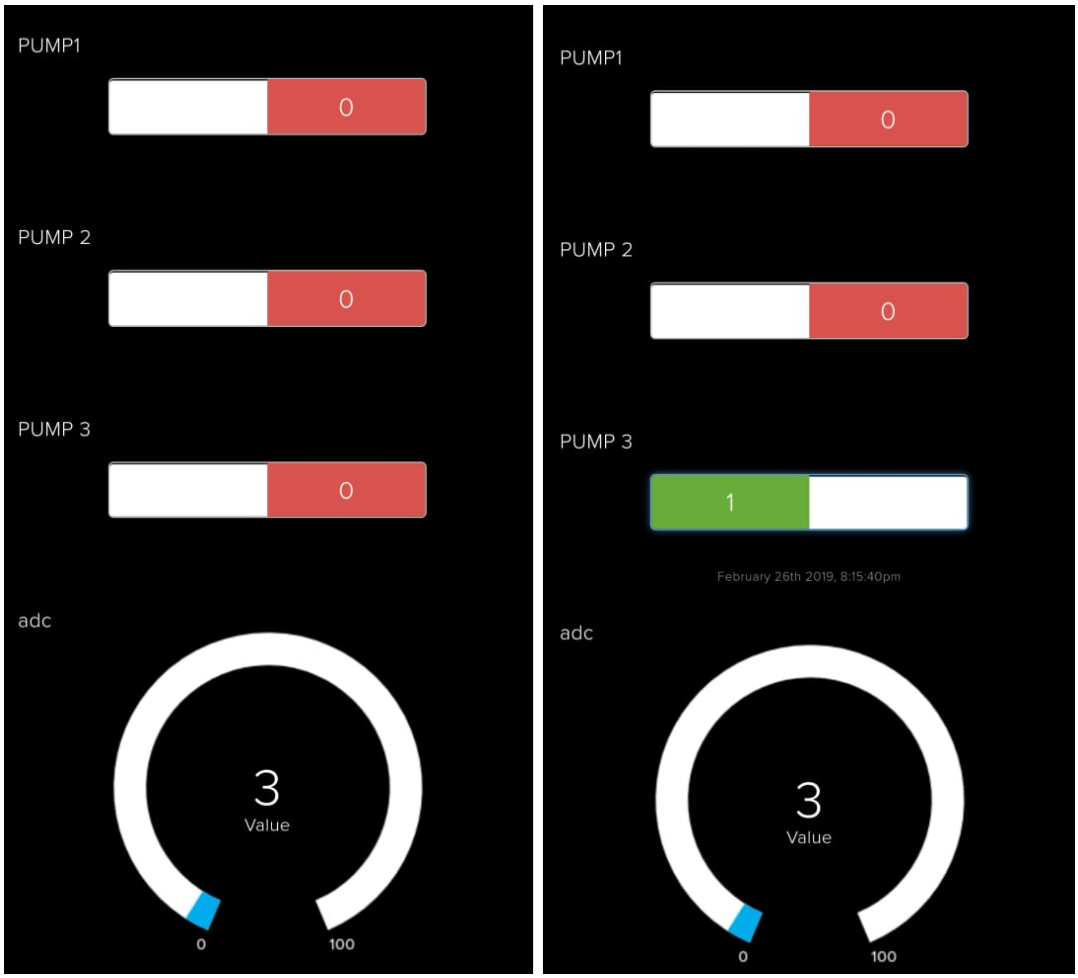
OUTPUT IMAGE



IV. CONCLUSION

Thus the sensors will be controlled by the distribution team. Man power is reduced in the distribution team. The water quality is observed and maintained in this project. The leakage detection can be identified in this project and the Central office can control the whole setup using the IoT based smart water distribution and management system. The water crisis can be reduced and the future usage of water can be maintained by the management and distribution team.

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