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Portable and Automatic Water Quality Monitoring and Notification System

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Abstract: ***The water is main entity for the survival of human being and so use of water in day to day life is enormous. Though in urban areas enough care is taken to purify the water used for drinking and regular use, the scenario in rural area is quite different. Even in the semi urban or town level places in India the number of water purification plants or the resources, to do water purification are not adequate or sometime not put at its place properly. In some small cities it has been observed that the water coming from Municipal Corporation may get impure at some intermediate source like pipeline leakage or damage in the storage facilities. Sometime the ignorance of the authority in maintenance work is also the reason that the citizens do not get pure water. In rural India there is no adequate supply of purified drinking water and people may heavily rely on the natural sources like Well, Lakes, water reservoirs, and the like. People are not sure that the water they get from all different sources is really usable or not. But as they do not have any alternative source they keep using the same water which perhaps is harmful for their health and lives. Unless the quality of water is tested by any government authority the people in rural area are bound to use the unusable water without any proper treatment on it.***
To make the water quality monitoring more practical, portable and cheap we are going to develop the systems and methods to do water monitoring using portable devices. The proposed system and methods will generate alert when it is being just ping by user at its end by using mobile device or smart phone
Keywords: Water quality Monitoring, PH Sensor, Nitrate sensor, GSM, Embedded system, Raspberry PI

I. INTRODUCTION

The water being very essential for human life, its purity is important for human and animal health. The source of water may not be reliable due to many factors like water storage is open, water storage is huge and enough care is not being taken by authority or the like.

Proposed system provides easy and simple mechanism to know water quality used by common person. It contains different sensors for getting water quality parameters. System gets water parameters from sensors through embedded processor. Processor then processes the output of the sensors and check weather water is consumable or not. If water is not consumable then alerts the corresponding authority else it stores the reading in the database.

Android application can be used by the user for receiving the water reading from the installed field setup. The person having no android or smartphones can check the water parameters readings through SMS. The android application can be used by the normal user for checking whether the water is consumable or not.

II. LITERATURE REVIEW

Existing system has a mechanisms which are semi-automated or manually controlled devices which are to be handled by a person responsible for monitoring the water quality. There need to have human intervention in taking various reading of the water parameters. The instruments or tools are used either by putting/inserting a water sensing part into water and seeing the result on small display device or by directly inserting a portable device in water and watching the output on the display.

Central Water Commission (CWC) monitors water quality [1][2], by collecting samples from representative locations within the processing & distribution system. These samples are analyzed at the well-equipped laboratories. At these laboratories samples from raw water, filter water and treated water are taken for analysis, these analysis can be performed by human intervention which for specific period only. The disadvantage of this system is, water is not monitoring seamlessly, and it always needs a human intervention.

[4] In Real Time Water Quality Monitoring System is a Sensor-Based Water Quality Monitoring System. The system architecture consists of data monitoring nodes, a base station and a remote station. All these stations are connected using wireless

communication link. The data from nodes is send to the base station consisting of ARM controller designed for special compact space application. Data collected by the base station such as pH, turbidity, conductivity, etc is sent to the remote monitoring station. Data collected at the remote site can be displayed in visual format on a server PC with the help of MATLAB and is also compared with standard values. If the obtained value is above the threshold value automated warning SMS alert will be sent to the agent. Disadvantage of this system is, it is MATLAB based system, which is not portable. To overcome this disadvantage, our system will use Raspberry Pi which is comfortable with Linux operating system and allows to program in many languages which are open source and there is no need to maintain data on computer system. By using this technology our system becomes portable.

[5] In this paper, Li Zhenan, Wang Kai, Liu Bo has worked on Sensor-Network based Intelligent Water Quality Monitoring and Control, they focused on the monitoring and control of water quality in natural water bodies such as rivers and lakes. Disadvantage of this system is that it uses to monitor the water from rivers and lakes, which is not monitoring the water from storage system. In some small cities it has been observed that the water coming from Municipal Corporation may get impure at some intermediate source like pipeline leakage or damage in the storage facilities. Sometime the ignorance of the authority in maintenance work is also the reason that the citizens do not get pure water. So this existing system is not adequate in above scenario. Our proposed system will overcome these problems.

III.PROPOSED SYSTEM

An objective of proposed system is to provide methods for Portable and Automatic Water Quality Monitoring and Notification System which saves time and resources of human by notification system. This notification will be get by Authorized person when sensor will detect bad water quality and if any user wants to know the current status of the water just he need to give the miscall to the our GSM system. For this features, our System has a mobile device and field setup device to monitor water quality remotely.

This system has Temperature sensors, PH Sensor, Nitrate sensor and Dissolved oxygen sensor to detect various parameters present in water. This system which provides instruments/tools present in field setup device which automatically detect and store the captured water quality parameters in local storage of the portable monitoring device. Even this system has small display unit present in field setup device to see the water quality parameter at site without any separate mobile device. It also has GSM module present in field setup device to accept the commands given by the mobile device remotely and it send to controller unit. The result of the command processed by a control unit is sent back to mobile device as SMS. Through this device it is possible to have 24x7 monitoring module which keeps monitoring the water quality round the clock.

The System also has functionality of monitoring the water quality 24x7 and if it detects the water quality to be unusable or dirty and the quality is poor and impurity of water is above the standard threshold value then an alert message is send to authority automatically as text message so that the concern authority like head of apartment or owner of the house or the head of the water resource/reservoir management can take appropriate and timely action.

Figure-1 and figure-2 shows the architecture of this system. This system has a field setup unit which does the task of actual monitoring of water quality parameters. It has a sensor mechanism to monitor the water quality parameters. The sensors input end is put in water to be tested and the output of sensors is captured and processed further. Field setup unit has a controller mechanism to process the data of water quality parameters and the command sent by the user using mobile device. The controller unit in this mechanism can be an embedded processor or microcontroller or a smart device like raspberry pi. The controller unit can perform the water quality analysis by using the parameters given as input by various sensors and send it to user as SMS. The controller can also interpret the commands send by user as SMS sting and can perform the task intended by the string command. It has a display unit to display data of water quality parameters. The display unit can be a simple seven segment LED or any sophisticated display device.

The field setup unit has a GSM module to communicate with user mobile device. The GSM module is capable of receiving the command strings from user mobile device and sending it in turn to controller unit for processing. The GSM module also sends the result of the command string sent by user as SMS response.

It also has a Mobile device provided to end user to communicate with field setup unit via GSM module. The user mobile has a SIM which is registered with field setup unit and using this SIM, the user can query the system to know the water quality parameter via SMS response from field setup unit. The mobile device can also issues the relevant commands to the controller unit to perform various processing tasks of the controller unit. It has functionality of accepting the miss call from the user which is then sent to the monitoring unit of the system. The system will immediately capture the water quality details by instant monitoring the water and the result as text message is sent to the user via GSM module of the system.

It has functionality of monitoring the water quality 24x7. The continues water quality monitoring module detects the water quality after certain predefined time slice and checks that whether the water is unusable or dirty. If quality of water is poor and its impurity

is above the standard threshold value then an alert message or notification is send to authority automatically as text message so that the concern authority like head of apartment or owner of the house or the head of the water resource/reservoir management can take appropriate and timely action

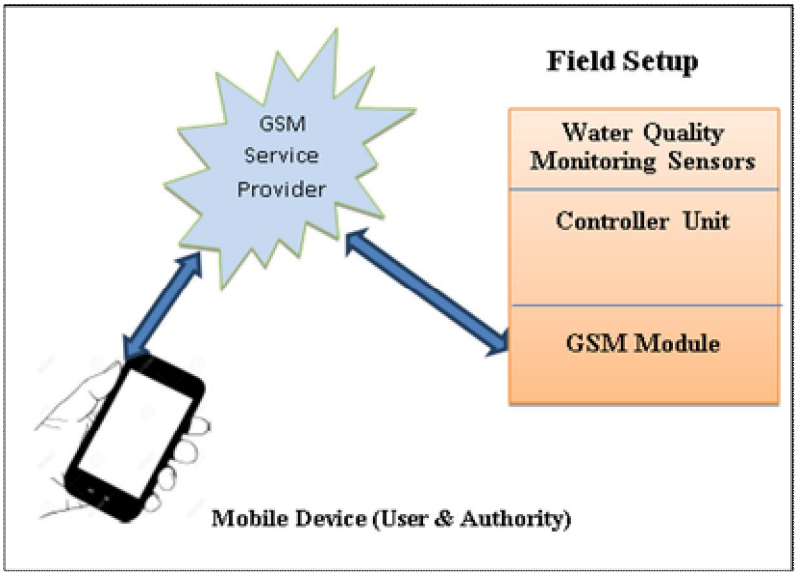

Fig. 1 Architecture of portable water quality monitoring system and notification system.

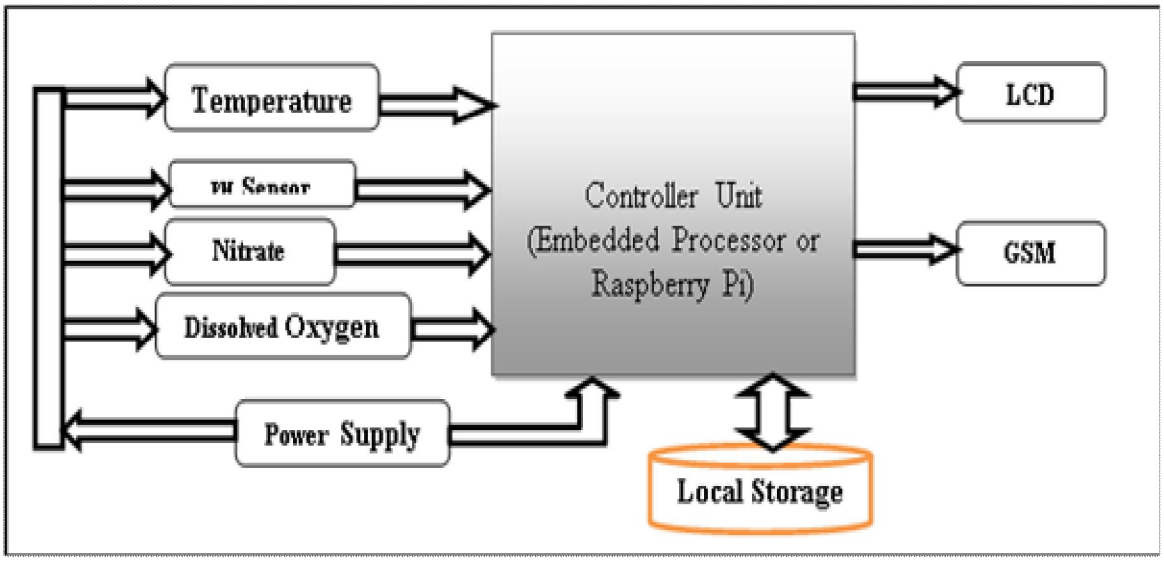

Fig. 2 Field Setup of Architecture

IV. COMPONENTS AND ALGORITHMS USED IN PROPOSED SYSTEM

A. Sensors

In our proposed system we are working with PH sensor, Nitrate Sensor, Raspberry PI, GSM module.

B. PH meter

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or alkalinity expressed as pH. [2] The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter". The difference in electrical potential relates to the acidity or pH of the solution.

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Fig. 3 pH Sensor

C. Nitrate Sensor

Monitoring nitrates in real-time for drinking water and wastewater is straight forward and affordable with Real Tech's nitrate sensors. Using the UV absorption measurement principle, precise, accurate and reliable data can be obtained without the use of reagents or complex sample preparation. This simple and effective method saves time and labor, providing a practical solution for many real-time nitrate monitoring applications.

Fig. 3 Nitrate Sensor

D. Raspberry PI

[5] Raspberry pi is a pocket personal computer with Linux operating system on it. This is great cheap to encourage young people for learning, programming, experimenting and for making innovation. Resembling like motherboard, raspberry pi has all the components to connect inputs, outputs and storage.

Fig. 3 Raspberry Pi

E. Algorithms

1) Algorithm for sensor module

a) Start

b) Initialize temperature count, Dissolved Oxygen count, Ph count, ammonia count and nitrate count to 0.

Temp_Count = 0;
DO_Count = 0;
PH_count = 0;
Ammonia_Count = 0;
Nitrate_Count = 0;

c) Read the sensor values from Initialize temperature count, Dissolved Oxygen count, Ph count, ammonia count and nitrate count

d) If Temp_Count >=26C && Temp_Count <= 33C then

e) Send message "Water Quality OK"

Send Sensors Values
Temp_Count ; DO_Count;
PH_count; Ammonia_Count; Nitrate_Count;
To GSM Module

f) Else

Go to step 10

g) If PH_count >=7.5 && Temp_Count <= 8.5?

Then go to step 5
Else
Go to step 10

h) If Ammonia_Count <1 ppm Then

Then go to step 5
Else
Go to step 10

i) If DO_Count > 3 ppm? Then

Then go to step 5
Else
Go to step 10

j) Send message "Water Quality not OK"

Send Sensors Values
Temp_Count ; DO_Count;
PH_count; Ammonia_Count; Nitrate_Count;
to GSM Module

k) Stop

2) Algorithm for sensor module

a) Start

b) Initialize timer counter to T

Timer_count=t

c) If command is missed all then

Read command from GSM module then
Call sensor module

d) If timer_count=0 then

Call sensor module

e) Stop

3) Algorithm for GSM module

a) Start

b) Get command from mobile user

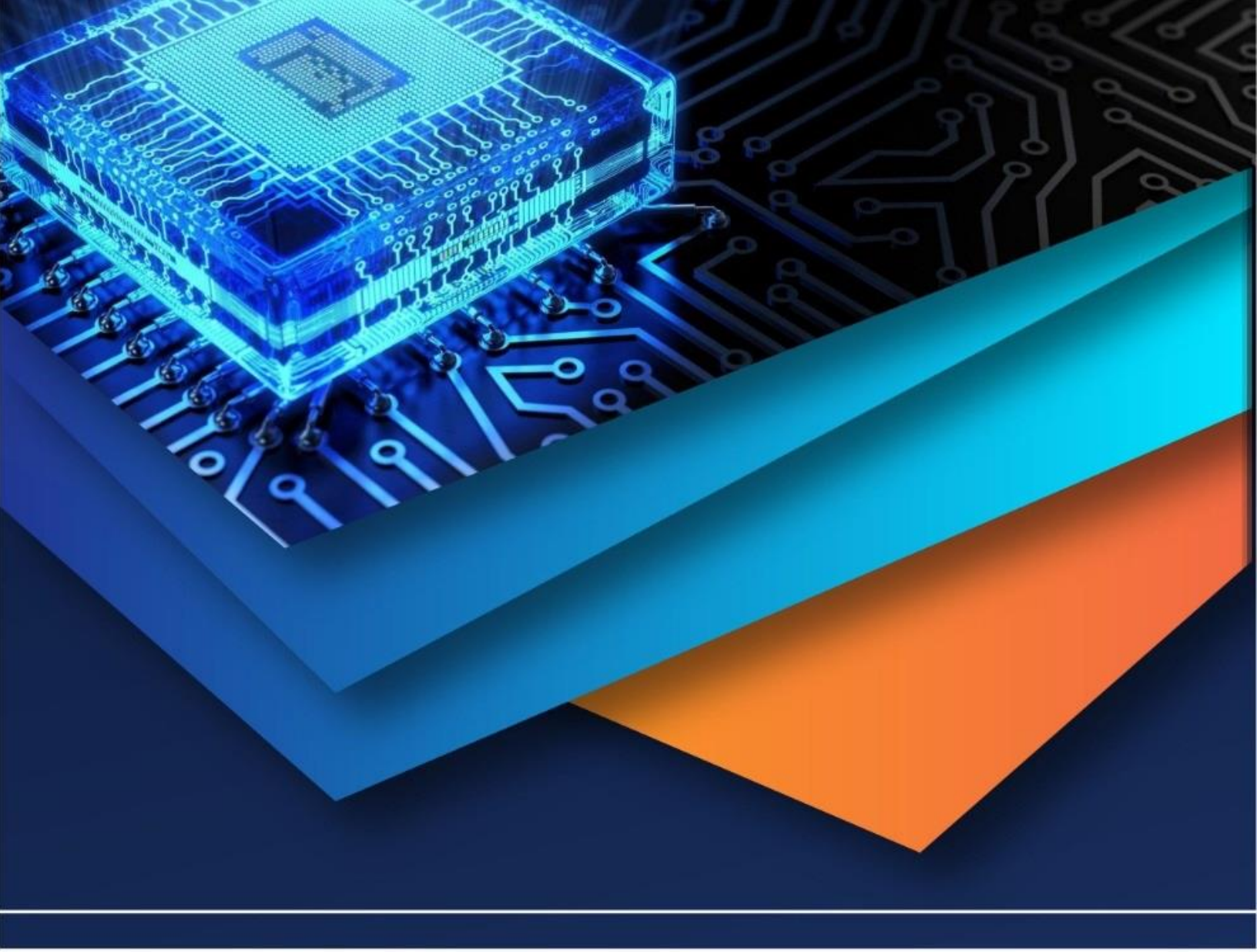
c) Send command to controller unit
d) Command processing by controller unit
e) Ger command processing output from controller unit
f) Send command processing output to mobile
g) Check whether system signal is ON or OFF
i) If ON then go to step 2
ii) If OFF then stop.
h) Stop

V. CONCLUSION

The paper addresses about developing a portable water quality monitoring and notification system, which examines water quality and notify the same to the authorized user or the any user who wants know the current status of water quality by simply given miscall to the system, by which human can saves time and the resources. Even we can use this system in urban area, rural area or in any organization or society and all the places where water is going to be store. By using this system human can use or drink pure water which is not harmful for the health.

REFERENCES

[1] Report on Water Quality Monitoring "Hot Spots" in Rivers of India (Central Water Commission, New Delhi), Aug, 2011
[2] Guidelines for Water Quality Monitoring Central", Central Pollution Control Board, 2007-2008
[3] Mithila Barabde, Shruti Danve, "Real Time Water Quality Monitoring System", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 3, Issue 6, June 2015.
[4] Li Zhenan, Wang Kai, Liu Bo, "Sensor-Network based Intelligent Water Quality Monitoring and Control", International Journal of Advanced Research in Computer Engineering &Technology (IJARCET) Volume 2, Issue 4, April 2013
[5] Sneha Angal , "Raspberry pi and Arduino Based Automated Irrigation System", International Journal of Science and Research, Volume 5 Issue 7, July 2016.



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