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IOT Based Smart River Monitoring System

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ABSTRACT

The project involves the approach of the Internet of Things (IoT) which will be done using a microcontroller. We are using customized sensor's node for monitoring the parameters of water like pH, turbidity, temperature, oxidation-reduction potential, Dissolved Oxygen, industrial wastes, hospital waste etc. The information is going to be level-headed constantly and this information will be consigned to the database using TCP protocol and if the tolerable limit is exceeded, a warning will be notified to authorities by IFTTT protocol and Twitter API push notification so that the necessary actions are taken.

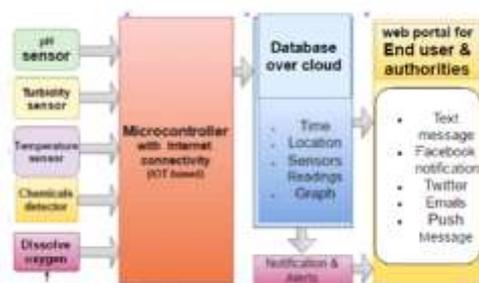
Keywords: IOT, Website, Application, IFTTT, Notification TCP, API.

1. INTRODUCTION

Rivers are important for all the living beings on the surface of the earth in different ways. Rivers import water and nutrients to all the areas around the earth. They play a very important part in leading the water cycle, functioning as drainage channels for surface water. Rivers drain on nearly 75% of the earth's surface. Humans are directly related to these water bodies. One common example is irrigation, which depends on the river water, also humans consume aquatic bodies like fishes, and hence humans are directly dependent on aquatic life as well. But nowadays this river water and its resources are being altered crudely by many external elements like a domestic waste, industrial waste, medical waste etc. By virtue of which the river water is polluted & then aquatic life, irrigation is affected. So there is a need to process, monitor and control the level of water pollution.

The project involves the approach of the Internet of Things (IoT) which will be done using a microcontroller. We are using customized sensor's node for monitoring the parameters of water like pH, turbidity, temperature, oxidation-reduction potential, Dissolved Oxygen, industrial wastes, hospital waste etc. The information is going to be level-headed constantly and this information will be consigned to the database using TCP protocol and if the tolerable limit is exceeded, a warning will be notified to authorities by IFTTT protocol and Twitter API push notification so that the necessary actions are taken.

2. BLOCK DIAGRAM



- pH sensor which consists of pH electrode and pH processing circuit which connected to Microprocessor
- Turbidity sensor which made by set of IR (Rx,Tx) connected to the microprocessor further in microprocessor it calibrated to the standard value
- Temperature Sensor ds18b(Digital output) connected directly to the microprocessor

- DO Sensor which connected to the microprocessor and all values are calibrated
- All values are in microprocessor here it calibrates and then all go to the portal and a Push Notification to the End User through E-mail, SMS, Facebook Page, Twitter.

3. OPERATIONAL OVERVIEW

A. pH Sensor

It checks the pH value of water to determine the acidity and basicity. 7 pH indicates that the liquid is neither acidic nor basic. 0 pH indicates extreme acidic and 14 pH indicates extreme basic conditions. Thus it will sense the pH value and give its corresponding voltage value at the output for further processing. pH sensor is the combination of pH electrode and signal conditioning circuit.

B. Turbidity Sensor

Turbidity is the number of undissolved substances in the liquid. Thus we need to check the turbidity to determine for the amount of undissolved particles like iron, copper, zinc particles from the industries, mud etc. Thus the sensor provides the data in the form of analog voltage for processing

C. Temperature Sensor

Increase in temperature of the water can affect aquatic life. Also, change in temperature affects parameters of water like pH and Oxygen Reduction Potential. This can cause a potential threat to all living beings and after a certain temperature some chemical reactions take place and compose toxic compounds that are totally dangerous for all living beings. Hence, the temperature of water constantly needs to be monitored

D. Dissolve Oxygen Sensor

It determines the amount of oxygen dissolved in water by virtue of which we can identify the number of parameters like the health of aquatic bodies, irrigation quality and Algae generation which consumes a huge amount of oxygen from water and surroundings which is toxic.

E. Microcontroller Board

The microcontroller obtains the data from the above-mentioned sensors and processes the received raw data converts it in desired units and calibrates for processing. The microcontroller board requires an internet connection so that the processed data can be transmitted over the internet to save it in our database. The internet connection can be wired or wireless. But it is preferable to use wireless internet connection. So, a better option is using a Wi-Fi. Thus, the board will communicate over the internet and saves the data in the database.

F. DATABASE OVER INTERNET

It is a server where the data is stored. The microcontroller board will dump the information in the database using TCP protocol to Thingspeak and from thingspeak using i-frame we put data on our smart monitoring website (smart city). We can also save information about the time when the data is logged by creating a log file on Thingspeak cloud. A channel is created, corresponding to each sensor's node on the database. The data corresponding to each node is fed to the respective channel. We can also create a graph which is a plot of sensor data with respect to time & using IFTTT (If This Then That) protocol and then an SMS is sent to the end user. This database is accessible to the authorized user whenever he needs data for analysis.

G. ALERT NOTIFICATION

Notification is provided through Twitter, Facebook notification by updating status and sending a text message to the end user (IFTTT protocol).

H. WEB PORTAL

Monitor the status of pH, turbidity, dissolve oxygen, temperature etc. On this site, we are also providing login access to Authorities & Inspector of Municipal Corporation.

The end user will be the authority in-charge of a particular area where the node is placed. This authority will be equipped with a smart device like a mobile phone. In case, if the sensors data exceeds the threshold value, this user is warned by a notification. Thus, the corresponding authority can take necessary action against the changes in threshold sensor values as provided.

4. HARDWARE AND SOFTWARE SPECIFICATIONS

Hardware Used

Raspberry Pi Model 3b	Microprocessor
Arduino	Microcontroller
DHT22	Humidity Sensor
DS18B	Water proof Temperature sensor
Push Button	
Infra-Red(Tx,Rx)	
Resistors	1K,4.7K,10K,120 ohm
Connectors	
PCB Making	
Battery	12v
Transistors	1N
LEDs	4mm,RED,GREEN
Connectors	
Jumpers	Male-Female

Software Used

- Raspberrian OS
- Wordpress
- Xampp
- FileZilla
- Eagle
- Arduino IDE
- python

5. WORK COMPLETED

- *Nodes Module*- Various sensor nodes have developed e.g. A) pH sensor –to detect the acidity and basicity. B) Turbidity sensor- to detect the amount of undissolved substances in the liquid. C) Temperature sensor- Increase in temperature of the water can affect aquatic life, also, change in temperature affects parameters of water like pH and Oxygen Reduction Potential. D) Dissolve Oxygen Sensor: It determines the amount of oxygen dissolved.
- *Database over the Internet*: we have developed a server where the pollutants data is forwarded for storage and further analysis. The programmable gadget push the information in the database using TCP protocol to Thingspeak (used for prototype) and from Thingspeak using i- frame we fetch data on our smart monitoring one-stop interactive portal (smartcitymonitor.in). We can also save information about the time when the data is logged by creating a log file on Thingspeak cloud. A channel is created, corresponding to each sensor’s node on the database. The data corresponding to each node is fed to the respective channel. We can also create a graph which is a plot of sensor data with respect to time & using IFTTT (If This Then That) protocol and then an SMS is sent to the end user. This database is accessible to the authorized user whenever he needs data for analysis.
- *Alert Notification*: Notification is provided through Twitter, Facebook notification by updating status and sending a text message to the end user (IFTTT protocol).
- *Common Web portal for bureaucrat*, Municipal Corporation’s environment division, pollution control sevak and end user. Monitor the status of pH, turbidity, dissolve oxygen, temperature etc. On this site, we are also providing login access to Authorities & Inspector of Municipal Corporation. The end user will be the authority in-charge of a particular area where the node is placed. This authority will be equipped with a smart device like a mobile phone. In case, if the sensors data exceeds the threshold value, this user is warned by a notification. Thus, the corresponding authority can take necessary action against the changes in threshold sensor values as provided.

6. PORTAL PHOTOS

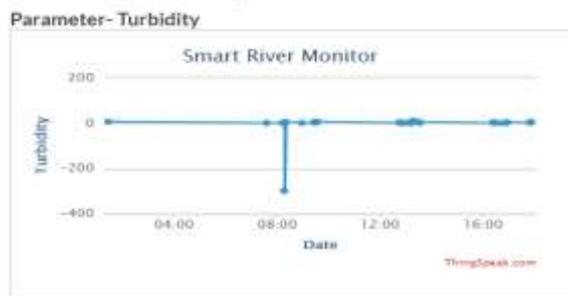


River Acidic Level (PH Quality)



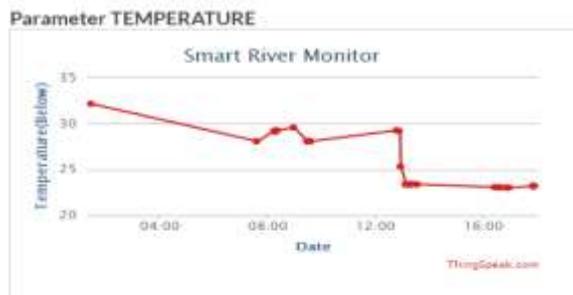
Note: Alert will be generated; if pH crosses <3.5 and >9.5 pH range.

River water Turbidity



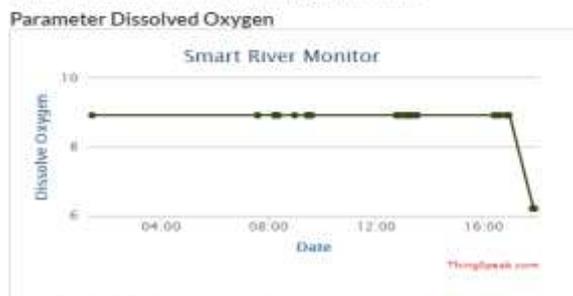
Note: Alert will be generated; if Turbidity crosses 50.

River Water TEMPERATURE status



Note: Alert will be generated, if reading crosses reference.

River Water Dissolved Oxygen Status



Note: Alert will be generated, if reading crosses reference.

7. CONCLUSION

By introducing this system we can Audit a river and completely monitor accurately and all values are available on the portal and in public domain as well so any one can see the actual live condition of the river and if any industry put their waste as uncontrolled manner can be detected and, can claim them. A government body can directly Monitor and take action against them and Do the recovery the river to its healthy condition.

8. REFERENCES

- [1] Water Resource Information System of India(2017).
http://www.indiawris.nrsc.gov.in/wrpinfo/index.php?title=River_Water_Quality_Monitoring. Accessed 2 May 2017.
- [2] Tomoaki K, Masashi M, Akihiro M, Akihiro M, Sang L (2016) A wireless sensor network platform for water quality monitoring. In: IEEE Sensors, Oct. 30-Nov. 3 2016.
- [3] Offiong N, Abdullahi S, Chile B, Raji H, Nweze N (2014) Real-Time Monitoring Of Urban Water Systems for Developing Countries. IOSR J Comput Eng 16(3):11–14.
- [4] Liang Li (2014) Software development for water quality's monitoring center of the wireless sensor network. Computer Modeling New Tech 132–136.
- [5] Central Ground Water Board (2017) Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India. <http://cgwb.gov.in/>. Accessed 24 July 2017.
- [6] Bushra R, Mubashir HR (2016) Applications of wireless sensor networks for urban areas: A survey. J Netw Comput Appl 60:192–219.