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Smart Water Quality Monitoring System Using Iot Environment

Nikhil R[1], Rajender R[2], Dushyantha G R[3], M N S Khadri[4], Jagadevi N Kalshetty[5]

[1,2,3,4,5]*Department of Computer Science and Engineering, NMIT, Bengaluru, Karnataka, India*

Abstract - Since the water quality monitoring system is a critical implementation for the issue of pollution of water, with increase in the development of technology and advancement in the Internet of Things (IOT) environment, the real time water quality monitoring system is remotely monitored by the means of storing the data, transmission and processing. This paper presents a smart water quality monitoring with sensor interface device in internet of things. The smart water quality system consists of design board, sensors, Wi-Fi module and personal computer. It is programmed in high speed integrated circuit hardware description language and embedded c programming language. The proposed system collects the five parameters of water such as water pH, water level, turbidity, conductivity and temperature of water with high speed from various sensors using thing speak.

Keywords – Internet of Things (IOT); smart water parameters; Sensors; Wi-Fi; and Thing Speak.

I. INTRODUCTION

Water is used in various activities, like consumption, agriculture and travel, which may affect water quality. Therefore, the water quality monitoring is necessary which includes several chemical parameters some of these are pH, redox potential, conductivity, and dissolved oxygen, ammonium and chloride ion amount. The water quality problems of surface water bodies are predominately caused by organic and nutrient material loads. More than 90% of the River Basin Management Plans (RBMP) assessed indicated that agriculture is a significant pressure in the basin, including diffuse or point source pollution by organic matter, nutrients, pesticides and hydro-morphological impacts.

The Plan gives the diffuse Nitrogen and Phosphorous load of each surface water body identifying the load from agricultural waste water body identifying the load from agricultural, waste water treatment plan, urban and other areas to the water body. There is need to improve existing system for monitoring water bodies, given that laboratory methods are too slow to develop an operational response and does not provide a level of public health protection in real time. Improve and expand monitoring and assessment tools to ensure a statistically robust and comprehensive picture of the status of the aquatic environment for the purpose of further planning.

II. PROPOSED SYSTEM

The WSN in IOT projects enables the information and communication systems invisibly embedded in the environment since the sensor network enables people to interact with the real world remotely. Recently, an environmental monitoring system based on WSN system using different wireless communication standards has attracted intensive interest. The PC management software is developed using Arduino software platform. we have designed a project of water quality monitoring system using microcontroller, for Mobile communications assorted water quality monitoring sensors, Analogue to Digital Converter (ADC).Since microcontrollers have more complex architecture, the development time and cost increase due to the complexity of the project designs and architectures.

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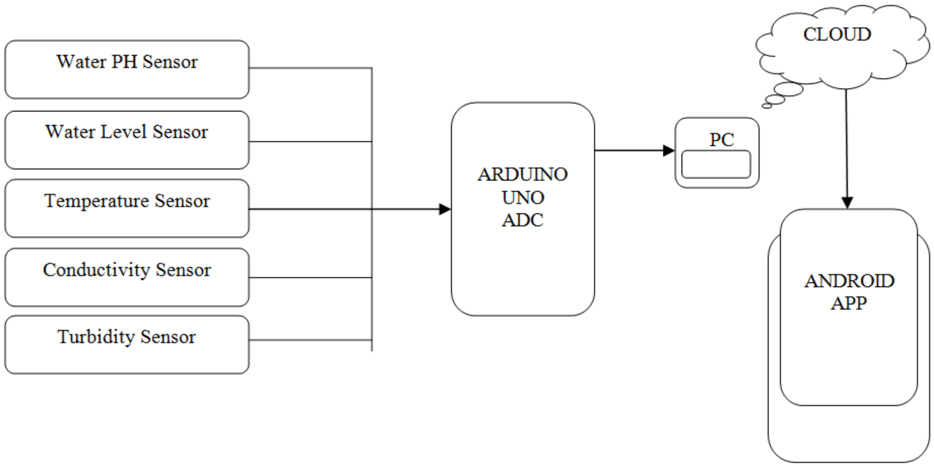

Figure 1: The diagram of smart water quality monitoring system in IOT environment

In the proposed smart water quality monitoring system, a reconfigurable smart water sensor interface device that integrates data storage, data processing, and wireless transmission is designed. The hardware experimental set-up of smart water quality monitoring system is shown in Fig.1. The hardware's of water quality monitoring system comprises the following components:

pH Sensor
Temperature sensor
Turbidity Sensor
Water flow sensor
Conductivity
Wi-Fi module
Arduino board

These are the few hardware components we have used in our project water quality monitoring system these hardware plays a very important role in this project as the software part. So the heart of the hardware components is the Arduino board and Wi-Fi module helps in transmission of the data.

The admin first registers himself to the cloud (LOGIN) then he can login to the cloud. After that the files are uploaded to the cloud where a folder is created then the file is forwarded where the values are stored and then the file is downloaded through the app in the Android phone.

The user login to his account then when the user gives a command to acquire values the file is first uploaded to the cloud and then the user can download the file. Finally the users can logout.

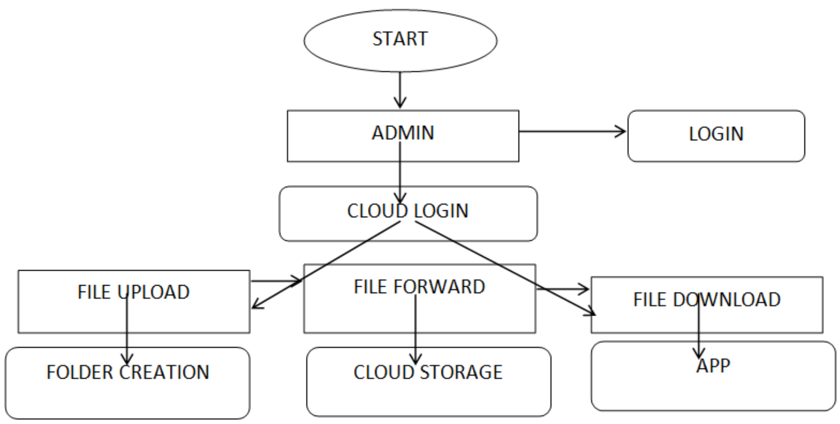

Figure 2: Architecture Diagram (Uploading File to Cloud)

The water quality monitoring using IOT consists of three levels:

1. Level 1 consists of the sensor part
2. Level 2 consists of the cloud part
3. Level 3 consists of the user part

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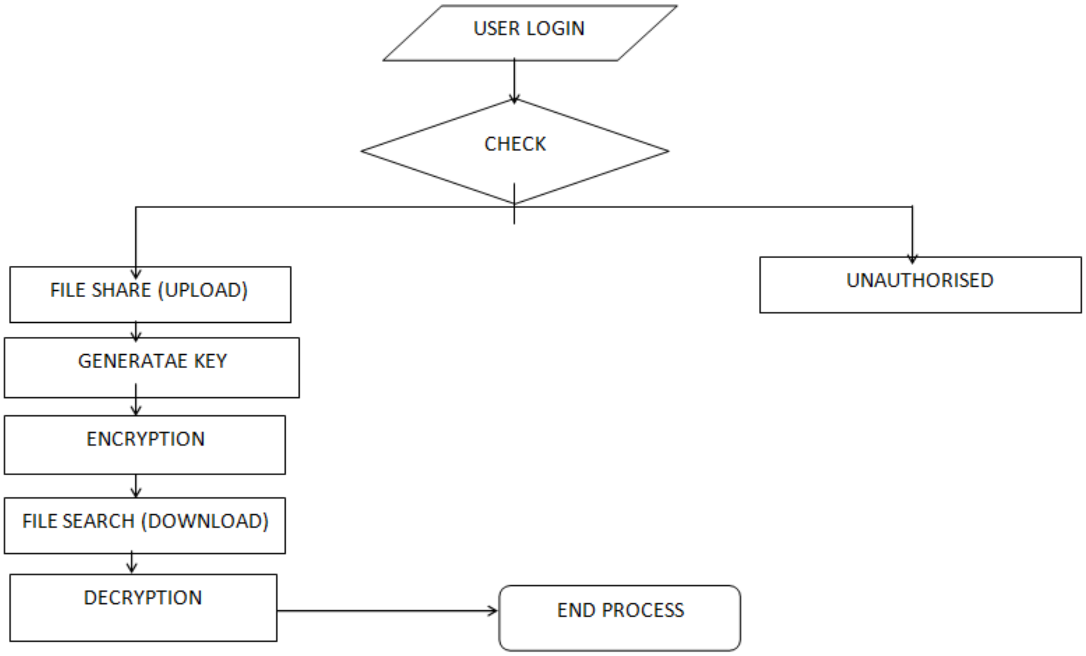


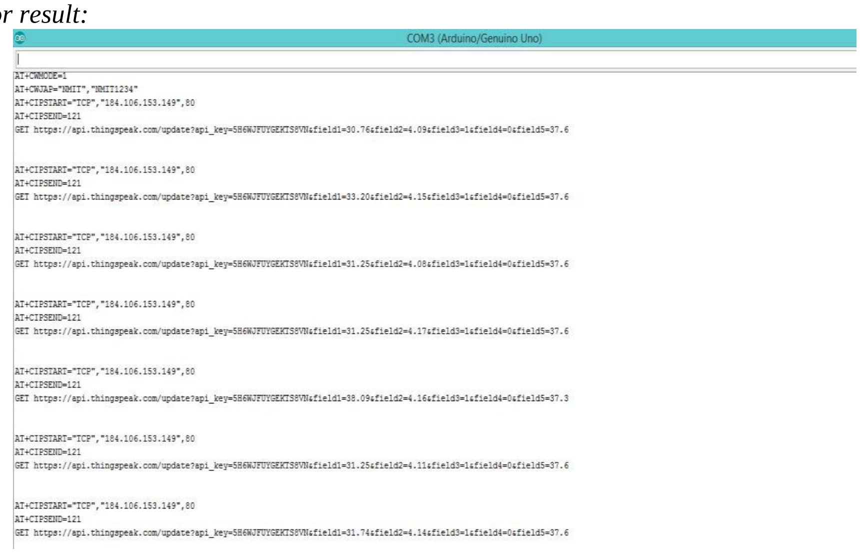
Figure 3: Architecture Diagram (How to Access Values from the Cloud and View in App)

To download a file from cloud the user logins the systems checks weather he is an authorized user or not. If he is an authorized user then he can share file i.e. he can upload the values to the cloud and then the key generation for encryption and when we search for a specific file i.e. want to download a file the decryption process takes place and then we can access the values.

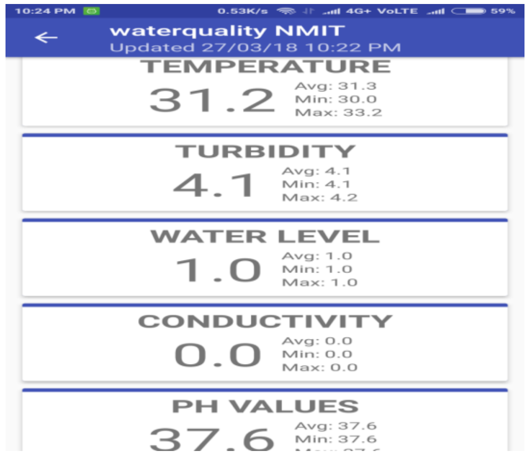
It describes different states of a component in a system. The states are specific to a component/object of a system. They define different states of an object during its lifetime. And these states are changed by events. So State diagrams are useful to model reactive systems. Reactive systems can be defined as a system that responds to external or internal events. State diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. So the most important purpose of State diagram is to model life time of an object from creation to termination.

III. EXPERIMENT AND RESULT

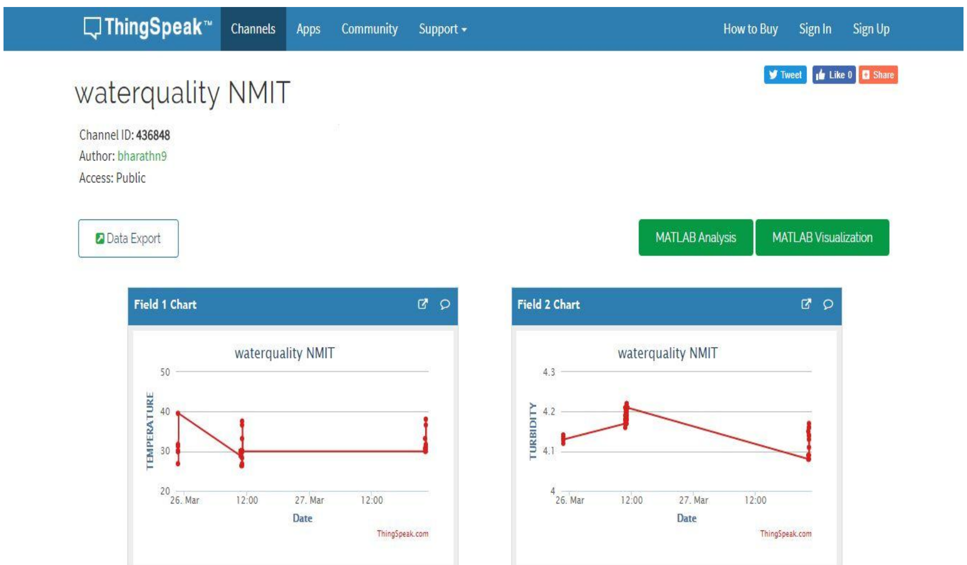
3.1. Serial monitor result:



3.2 Android App Results



3.3 Web Page Results



3.4 Experiment Results

RESULTS

	A	B	C	D	E	F	G
1	created_at	entry_id	field1	field2	field3	field4	field5
2	2018-03-23 11:55:25	1	30.27	3.91	1	0	37.6
3	2018-03-23 11:55:56	2	26.37	4.08	1	0	37.6
4	2018-03-23 11:56:27	3	30	4.1	1	0	37.6
5	2018-03-23 11:56:57	4	26.37	4.07	0	0	37.6
6	2018-03-23 11:57:28	5	31.74	4.11	0	1	37.6
7	2018-03-23 11:57:59	6	30	4.1	0	1	37.6
8	2018-03-23 11:58:32	7	30	4.05	0	1	37.6
9	2018-03-23 11:59:00	8	26.86	4.1	0	0	37.6
10	2018-03-23 11:59:31	9	36.62	2.9	0	1	37.6
11	2018-03-23 12:00:01	10	26.37	3.96	0	0	37.6
12	2018-03-23 12:00:33	11	30	4.15	1	1	37.6
13	2018-03-23 12:01:07	12	32.71	3.61	1	0	37.6
14	2018-03-23 12:01:33	13	30	3.23	1	0	37.6
15	2018-03-23 12:02:04	14	26.37	4.11	1	0	37.6
16	2018-03-23 12:02:35	15	26.86	4.08	1	0	37.6
17	2018-03-23 12:03:06	16	33.2	3.33	1	0	37.5
18	2018-03-23 12:03:36	17	30	3.32	1	0	37.6
19	2018-03-23 12:04:07	18	30	4.08	0	0	37.6
20	2018-03-23 12:05:39	19	30	4.03	1	0	37.5

3.5 Parameters to be tested

Water quality assessment provide the base line information on water safety. Since water quality in any source of water and at the point of use can change with time and other factors continuous monitoring of water is essential.

1. Microbiological parameters
2. Physical parameters
3. Harmful chemicals

IV. CONCLUSION

The proposed smart system of single chip solution to interface transducers to sensor network using Arduino is presented with wireless method by using a IOT. The results of the five parameters of water quality are verified that the system achieved the reliability and feasibility of using it for the actual monitoring purposes. The water temperature may vary from 0 to 0.4 Degree Celsius depending on the speed of the ambient air temperature cycles. The time interval of monitoring can be changed depending on the need. The proposed system inherits high execution speed and reusable Intellectual Property (IP) design. The proposed system will assist in protecting the ecological environment of water resources. The smart system minimizes the time and costs in detecting water quality of a reservoir as part of the environmental management. The WSN network will be developed in the future comprising of more number of nodes to extend the coverage range.

V. REFERENCE

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