# IOT BASED INDUSTRIAL WATER QUALITY MONITORING SYSTEM USING TEMPERATURE, PH AND TURBIDITY SENSORS

<sup>1</sup>A.Divya, <sup>2</sup>G.Vidhya krishnan

<sup>1</sup>PG Scholar, <sup>2</sup>Assistant Professor Department of EEE, Gnanamani College of Technology, Namakkal, India.

*Abstract*: Water pollution is one of the biggest fears for the green globalization. In order to ensure the safe supply of the drinking water the quality needs to be monitor in real time. In this paper we present a design and development of a low cost system for real time monitoring of the water quality in IOT (internet of things). The system consist of several sensors is used to measuring physical and chemical parameters of the water. The parameters such as temperature, PH, turbidity, flow sensor of the water can be measured. The measured values from the sensors can be processed by the core controller. The Arduino model can be used as a core controller. Finally, the sensor data can be viewed on internet using WI-FI system. This paper proposes a low cost water quality monitoring system using emerging technologies such as IoT, Machine Learning and ting which can replace traditional way of quality monitoring. This helps in saving people of rural areas from various dangerous diseases such as fluorosis, bone deformities etc. The proposed model also has a capacity to control temperature of water and adjusts it so as to suit environment temperature.

Index Terms: Fluorosis, IoT, Bio-Medical Signal, Thing-Speak, Health Monitoring & Care System.

#### I. INTRODUCTION

In the recent year, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameters in real time.

The water quality parameters pH measures the concentration of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14 pH. For drinking purpose it should be 6.5-8.5pH.

Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higher the risk of diarrheoa, collera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold. Flow sensor measures the flow of water through flow sensor. The traditional methods of water quality monitor involves the manual collection of water samples from different locations.

The rest of this paper is organised as follows: section II review the related work of this project, section III describes the proposed system with the modules explanation, section IV provides the Schematic circuit with it working, Section V shows the results and discussion, section VI the conclusion with future scope.

# II. LITERATURE REVIEW

Nikhil Kedia entitled "Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project."Published in 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India. This paper highlights theentire water quality monitoring methods, sensors, embedded design, and information dissipation procedure, role of government, network operator and villagers in ensuring proper information dissipation. It also explores the Sensor Cloud domain. While automatically improving the water quality is not feasible at this point, efficient use of technology and economic practices can help improve water quality and awareness among people.

Jayti Bhatt, Jignesh Patoliya entitled "Real Time Water Quality Monitoring System". This paper describes to ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, conductivity, dissolved oxygen, temperature. The measured values from the sensors are processed by microcontroller and this processed values are transmitted remotely to the core controller that is raspberry pi using Zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing.

### III. EXISTING SYSTEM



Industry 4.0 as a Part of Smart Cities". This paper describes the conjunction of the Smart City Initiative and the concept of Industry 4.0. The term smart city has been a phenomenon of the last years, which is very inflected especially since 2008 when the world was hit by the financial crisis. The main reasons for the emergence of the Smart City Initiative are to create a sustainable model for cities and preserve quality of life of their citizens.

The topic of the smart city cannot be seen only as a technical discipline, but different economic, humanitarian or legal aspects must be involved as well. In the concept of Industry 4.0, the Internet of Things (IoT) shall be used for the development of so-called smart products. Subcomponents of the product are equipped with their own intelligence.

Added intelligence is used both during the manufacturing of a product as well as during subsequent handling, up to continuous monitoring of the product lifecycle (smart processes). Other important aspects of the Industry 4.0 are Internet of Services (IoS), which includes especially intelligent transport and logistics (smart mobility, smart logistics), as well as Internet of Energy (IoE), which determines how the natural resources are used in proper way (electricity, water, oil, etc.). IoT, IoS, IoP and IoE can be considered as an element that can create a connection of the Smart City Initiative and Industry 4.0 – Industry 4.0 can be seen as a part of smart cities.

#### IV. PROPOSED SYSTEM



Fig.2. Block diagram of Proposed system

# BLOCK DIAGRAM DESCRIPTION

In this, we present the theory on real time monitoring of water quality in IoT environment. The overall block diagram of the proposed method is explained. Each and every block of the system is explained in detail.

IJSDR1905061

In this proposed block diagram consist of several sensors (temperature, pH, turbidity, flow) is connected to core controller. The core controller are accessing the sensor values and processing them to transfer the data through internet. PIC is used as a core controller. The sensor data can be viewed on the internet wi-fi system.

#### V. METHODOLOGY

**1. Temperature Sensor:** To measure the human body temperature we LM35 sensor.LM35 sensor measure temperature more accurate than a using a thermister since it is industrial temperature sensor. It generate higher output voltage than thermocouple so no need to amplify the output voltage. The output voltage is directly proportional to the Celsius temperature. The scale factor is 0.1v/oc. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4^{\circ}$ C at room temperature and  $\pm 3/4^{\circ}$ C over a full -55 to +150°C temperature range. The range of this sensor is -550 C to 1500C. It is low cost and easily available sensor. It has also low self heating. LM35 has three terminal VCC, GND, O/P.

#### Features of LM35:

- Calibrated directly in ° Celsius (Centigrade)
- Linear +  $10.0 \text{ mV}^{\circ}\text{C}$  scale factor
- $0.5^{\circ}C$  accuracy guarantee able (at +25°C)
- Rated for full -55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 µA current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only  $\pm 1/4$  °C typical
- Low impedance output, 0.1 W for 1 mA load



**2. ph sensor sensor:** The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0-14 with a neutral point being 7. Values above 7 indicate a basic or alkaline solution and values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with pic. The normal range of pH is 6 to 8.5.



#### Fig.4. pH sensor

**3. Turbidity sensor:** Turbidity is a measure of the cloudiness of water. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Turbidity blocks out the light needed by submerged aquatic vegetation. It also can raise surface water temperatures above normal because suspended particles near the surface facilitate the absorption of heat from sunlight.



Fig .5.Turbidity Sensor

## 4. ESP8266 Module:



Fig. 6 Esp8266 module

ESP8266 requires 3.3V and if the Arduino Uno board provides it with5V then it will not function properly and it might get damaged. Connect the CH\_PD and the Vcc to the 3.3V pin of Arduino. The RX pin of ESP8266 requires only 3.3V and it does not respond to the Arduino when it is connected directly to the Arduino. So, a voltage divider for it is made which converts the 5V into 3.3V. This can be done by connecting three resistors arranged in series. Connect the TX pin of the ESP8266 to the pin 9 of the Arduino and the RX pin of the ESP8266 to the pin 10 of Arduino through the resistors. To setup the Wi-Fi name, Wi-Fi password and IP address of the Wi-Fi module ESP8266. To read the sensor and to convert the output of the sensor into BPM. Also, blink the LED connected at the pin 13 per the BPM. To set up the baud rate per the ESP8266. (either 9600 or 115200).

#### VI. CONCLUSION

We have identified a suitable implementation model that consists of different sensor devices and other modules, their functionalities are shown in figure. In this implementation model we used PIC16f877a with Wi-Fi module. Inbuilt ADC and Wi-Fi module connects the embedded device to internet.Sensors are connected to PIC board for monitoring, ADC will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameter will be evaluated.After sensing the data from different sensor devices, which are placed in particular area of interest. The sensed data will be automatically sent to the web server, when a proper connection is established with sever device.

#### VII. ACKNOWLEDGMENT

The authors of this project would like to thank guide Assistant Professor, G.Vidhya Krishnan and HOD, **Mr. J. CHANDRAMOHAN ME** (**Ph.D**) for guiding the entire project. The completion of this project would have been impossible without the involvement and encouragement of my guide G.Vidhya Krishnan.

# REFERENCES

[1] Nikhil Kedia, Water Quality Monitoring for Rural Areas- A Sensor Cloud Based Economical Project, in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India, 4-5 September 2015. 978-1-4673-6809-4/15/\$31.00 ©2015 IEEE

[2] Jayti Bhatt, Jignesh Patoliya, Iot Based Water Quality Monitoring System, IRFIC, 21feb, 2016.

[3] Michal lom, ondrejpriby&miroslavsvitek, Internet 4.0 as a part of smart cities, 978-1-5090-1116-2/16/\$31.00 ©2016 IEEE
[4] Zhanwei Sun, Chi Harold Liu, ChatschikBisdikia\_, Joel W. Branch and Bo Yang, 2012 9th Annual IEEE Communications

- Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks
- [5] (SECON), 978-1-4673-1905-8/12/\$31.00 ©2012 IEEE

[6] SokratisKartakis, Weiren Yu, Reza Akhavan, and Julie A. McCann, 2016 IEEE First International Conference on Internetof-Things Design and Implementation, 978-1-4673-9948-7/16 © 2016IEEE

[7] MithailaBarabde, shruti Danve, Real Time Water Quality Monitoring System, IJIRCCE, vol 3, June 2015.

[8] Akanksha Purohit, Ulhaskumar Gokhale, Real Time Water Quality Measurement System based on GSM, IOSR (IOSR-JECE) Volume 9, Issue 3, Ver. V (May - Jun. 2014)

[9] Eoin O'Connell, Michael Healy, Sinead O'Keeffe, Thomas Newe, and Elfed

Lewis, IEEE sensors journal, vol. 13, no. 7, July 2013, 1530-437x/\$31.00 © 2013 IEEE

