# Solar Power Environmental Air Pollution & Water Quality Monitoring System Based on IoT

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*Abstract: Water and air pollution 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 system we present a design and development of a low cost system for real time monitoring of the water quality in IoT(internet of things) an IOT Based Air Pollution Monitoring System in which we will monitor the Air Quality over a web server using internet and will trigger a alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO2, smoke, alcohol, benzene and NH3. It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it very easily. In this IOT project, you can monitor the pollution level from anywhere using your computer or mobile. 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 IP address.*

*Keywords -pH sensor; Turbidity sensor; Temperature sensor; Flow sensor; Arduino model; WI-FI module; Internet of things; air pollution; sensors; monitoring system; Arduino*

## I. INTRODUCTION

In the 21st century, 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[1]. 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 main objective of IOT Air Monitoring System is that the Air pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Due to flexibility and low cost Internet of things (IoT) is getting popular day by day. With the urbanization and with the increase in the vehicles on road the atmospheric conditions have considerably affected. Harmful effects of pollution include mild allergic reactions such as irritation of the throat, eyes and nose as well as some serious problems like bronchitis, heart diseases, pneumonia, lung and aggravated asthma. Monitoring gives measurements of air pollutant and pollution concentrations, which can then be analyzed interpreted and presented. This information can then be applicable in many ways. Analysis of monitoring data allows us to assess how bad air pollution and pollution is from day to day

## II. LITERATURE SURVEY

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 the entire 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.[1]

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.

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Finally, sensors data can view on internet browser application using cloud computing.[2]

The system to monitor the air of environment using Arduino microcontroller, IoT Technology is proposed to improve quality of air. With the use of IoT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issue proposed in this paper. Here the using of MQ 7 gas sensor gives the sense of different type of dangerous gas and arduino is the heart of this project which controls the entire process. Wi-Fi module connects the whole process to internet and LCD is used for the visual Output.[3]

### III.  BLOCK DIAGRAM
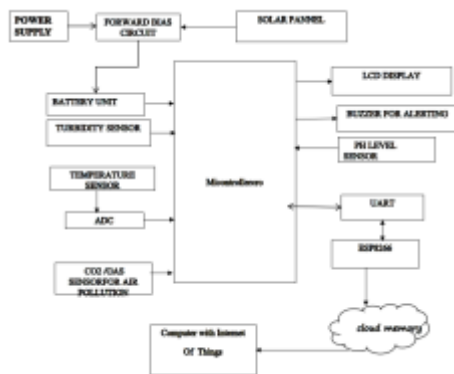


### III.     WORKING

- In this proposed block diagram consist of Solar panel, battery and several sensors (temperature, pH, turbidity, Gas) is connected to core controller.

- The core controller are accessing the sensor values and processing them to transfer the data through internet.

- The MQ7 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2 and some other gases.

- When we will connect it to Arduino then it will sense the gases, and we will get the Pollution level in PPM (parts per million).

- Sensors gives the output in form of voltage levels and we need to convert it into PPM.

- The Sensors data (information )can be viewed on the system  through the IoT module.

### IV.  SYSTEM DESIGN OF MODEL
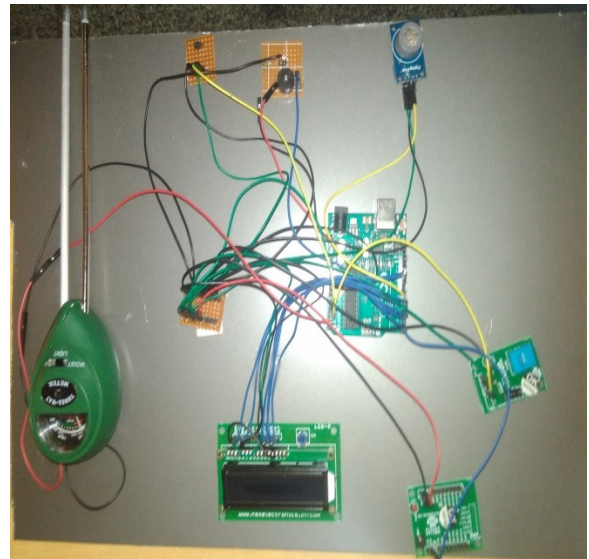


### V.  RESULTS AND DISCUSSION

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 ATMEGA 328 with Wi-Fi module. Inbuilt ADC and Wi-Fi module connects the embedded device to internet. Sensors are connected to Arduino UNO 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.

The system to monitor the air of environment using Arduino microcontroller, IOT Technology is proposed to improve quality of air. With the use of IOT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issue proposed in this paper.

Here the using of MQ7 gas sensor gives the sense of different type of dangerous gas and arduino is the heart of this project which controls the entire process. Wi-Fi module connects the whole process to internet and LCD is used for the visual Output. The Automatic Air is a step forward to contribute a solution to the biggest threat. The air monitoring system overcomes the problem of the highly-polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application.

### VI. CONCLUSION

Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network. The system can

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monitor water quality automatically, and it is low in cost and does not require people on duty. So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters.

The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

By keeping the embedded devices in the environment for monitoring enables self-protection (i.e., smart environment) to the environment. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the IoT module.

The air monitoring system overcomes the problem of the highly-polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application.

## VII. MERITS AND DEMERITS

### A. Merits and demerits for water pollution

| MERITS | DEMIRITS |
| --- | --- |
| • Helps in disposing harmful materials of the land surface and is inexpensive.<br>• Pollution is the introduction of contamination materials into the natural environment that causes adverse changes | • Aquatic life is destroyed due to non-biodegradable pesticides chemicals.<br>• Water pollution affects the microbial population.<br>• There is a steep increase in the BOD levels of water. |

### B. Merits and demerits for air pollution

| MERITS | DEMIRITS |
| --- | --- |
| Increased carbon dioxide means that plants grow a little faster and a little bigger | Ozone (specifically, ground-level ozone): irritant, can trigger asthma attacks, also a carcinogen. |
| Ozone killing pollutants mean that you can tan more quickly. | Also damages crops and reduces yields, damages forests, etc. |
| And lighter night skies | Fine Particulate Matter- inhaled, can |

also means that there will be fewer muggings | also cause respiratory distress and damage to the circulatory system.

## 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, ondrej priby & miroslav svitek, 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, Chatschik Bisdikia_, Joel W. Branch and Bo Yang, 2012 9th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks

[5] Riteeka Nayak, Malaya Ranjan Panigrahy , Vivek Kumar Rai and T Appa Rao:IOT based air pollution monitoring system Vol-3, Issue-4, 2017

[6] Navreetinder Kaur , Rita Mahajan and Deepak Bagai: Air Quality Monitoring System based on Arduino Microcontroller Vol. 5, Issue 6, June 2016

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