

Air and Water Pollution Monitoring System for Industries Using IoT

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Abstract- The pollution of air and water is increasing tremendously. Many challenges originate because of limited water resources, polluted air, growing population, ageing infrastructure. Therefore there is a need for better methodologies to monitor the water and air quality. To overcome this issue, we are introducing a system through which the level of harmful gases emitted from the industries and various water parameters can be detected as well as monitored. The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be water pollution or toxic gases (Air pollution) present in the environment leaves a harmful effects on human health and thus needs special attention. In this project we intend to present the design and development of a low cost system for real monitoring of water as well as air quality in an IoT environment. The system consists of 4 sensors namely MQ-7 for CO, MQ-135 for CO₂ which are used for measuring chemical parameters air and for temperature we use DS18B20 and for pH level the sensor used is WQ201. The parameters such as temperature and pH of the water also can be measured as well as various harmful pollutants such as Carbon Monoxide(CO), Carbon dioxide(CO₂) etc present in the air can be detected and monitored accordingly.

Index Terms- Internet of Things (IoT), Node MCU(ESP8266), water sensors, gas sensors.

I. INTRODUCTION

The main objective of IoT based industrial air water monitoring system is that the air and water pollution is a growing issue these days. It is necessary to monitor air as well as water quality and keep it under control for a better future and healthy living for all. Here we have implemented an air quality and water pollution monitoring system that allows us to monitor and check live air quality as well as water pollution from industries using IoT. System uses air sensors to

sense presence of harmful gases/compounds in the air and water sensors to sense the presence of harmful parameters from the water and constantly transmit this data. Also, our system keeps a track of both air and water pollution level and reports it.

II. RELATED WORK

Human beings breathe in and out approximately once every four seconds, which equates to over eight million times a year. As a consequence our lungs process around four million litres(4,000m³) of air from the earth's atmosphere, every year. The primary airborne pollutants are: SO₂, NO_x, Ozone, CO, CO₂, and particulate matter. Carbon dioxide (CO₂) is a poisonous gas that forms when the carbon in fuels such as gasoline, heating oil, natural gas, wood and charcoal does not burn completely. Carbon dioxide cannot be seen or smelled, but it can be dangerous to our health and in high concentrations, even deadly. The sources include industrial boilers, waste incinerators and natural events, such as wildfires. Levels of carbon dioxide in the air are typically highest during the winter, because vehicles work harder and burn fuel less efficiently in cold weather, and on winter nights, a strong inversion layer develops in the atmosphere, trapping pollution near the ground and preventing it from mixing with cleaner air above.

III. PROBLEM STATEMENT

Provide the industrial automation system which is accessible from global and provide the real time monitoring using ESP8266 Node mcu. It also provides the storage of data sent from the sensor for further analysis to keep a track of the emissions.

IV. GOALS & OBJECTIVES

Goals:

- The relevance of a project describes the outcome of the project that is expected and it needs to be with respect.
- The main goal of the project is to design IoT based industrial air and water pollution monitoring system based on toxic gas and water detecting and alerting system.

Objectives:

- To develop a Low cost effective system.
- The system continuously keeps a track on the emissions.

V. SYSTEM ARCHITECTURE

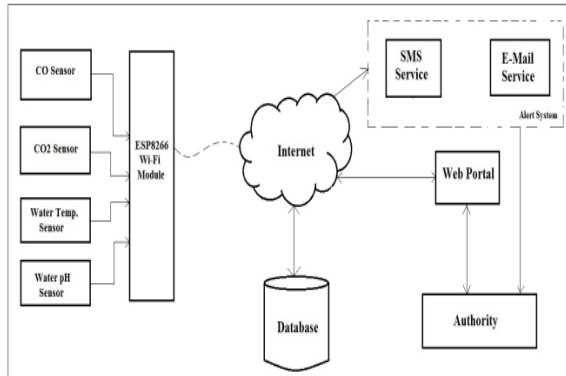


fig: System Architecture

The industrial application will help the citizen of a municipal corporation as well government to keep a watch on industrial pollution which will help to take an appropriate measure to control the air and water pollution. The pollution control board already decided the threshold value through which an industry have to follow. So our system will help them to keep monitoring continuously and store that data or readings in data each and every seconds. The system will also help in analysis and decision making about the pollution so that precautions can be taken. The system will also send alert text message as well as mail will be sent to the environment officer or authorized person if the value of pollutants exceeds than the threshold values. The figure above show the architecture of our system. The main thing is that the system is fully automated which will replace the manual work i.e. the existing system.

VI. SYSTEM OVERVIEW

The kit consists of four sensors (MQ7, MQ135, DS18B20 and pH sensor) which are connected to a Node MCU(ESP8266). All these sensors sense the data and upload the same to web so that the authorized person can be able to analyze the data from anywhere, at anytime. For every sensor, there is a specific threshold value set and if the values exceed this threshold then a text message and an e-mail is simultaneously sent to the authorized person. The plus point of this system is that it can be used commercially with a low maintenance cost.

VII. MATH

$S=U, I, O, P$

Where,

$U =$ Set of users

$n =$ No. of Processes.

$U_i = \{u_1, u_2, u_3, \dots, u_n\}$

Where $n > 0$

$=$ ex. Primary user.

$I =$ Set of Inputs

$I_i = \{i_1, i_2, i_3, \dots, i_n\}$

Where $n > 0$.

Output= {Air And Water Pollution Monitoring }

$P =$ Set of Processes

$P_i = \{p_1, p_2, p_3, \dots, p_n\}$

Where $n > 0$

VIII. CONCLUSION

We see our system is better than the existing (manual) system as it is compatible to small scale industries as well as large scale industries as our system will be cost effective/affordable. Our system being automatic will generate data on a regular basis. This system will help to the create awareness among the industries by making it easy to be installed in every industry. Hence using this system the adverse effects of pollution will be reduced and also each and every industry will get benefitted.

IX. FUTURE SCOPE

- 1) Our work will modify the existing model installed in industries with an automated system.

2) Detecting more parameters for most secure purpose by increasing the parameters with addition of multiple sensors in future.

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