



A REVIEW: AIR POLLUTION MONITORING SYSTEM USING IOT

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Abstract: Internet of Things (IoT) may be a worldwide system of “smart devices” which will sense and connect with their surroundings and interact with users and other systems. Global pollution is one among the main concerns of our era. Existing monitoring systems have inferior precision, low sensitivity, and need laboratory analysis. Therefore, improved monitoring systems are needed. To overcome the issues of existing systems, we propose a three-phase pollution monitoring system. An IoT kit was prepared using some sensors, Arduino IDE (Integrated Development Environment), and a Wi-Fi module. These kits are often physically placed in various cities to monitoring pollution. The sensors gather data from air and forward the data to the Arduino IDE. The Arduino IDE transmits the info to the cloud via the Wi-Fi module. It can be monitored from android mobile phone also. The proposed system is predict quality of air using different sensors and stored data in database and cloud so any one can retrieve data from anywhere anytime. Furthermore, air quality data are often wont to predict future air quality index (AQI) levels.

Index Terms - AQI, IDE, IoT, PM.

I. INTRODUCTION

Nowadays the air condition is much polluted. In recent years, car emissions, chemicals from factories, smoke and dust are everywhere. That is the reason why now air condition is much polluted. The effect of air pollution is very bad for our health, especially for place where the air in our body is taken for breathing. In our lungs may cause some diseases, such as asthma, cough, and lung disorders [1].

Air contamination has been a gigantic worry in nowadays. It became necessary to monitor air pollution and to keep it well within the limits for a better future and healthy living. Air contaminations cause different medical problems. Among this, CO, which is a result of fragmented ignition of fills, is the significant benefactor. Vehicular fumes are a significant wellspring of CO. The wellbeing risk because of steady presentation to CO is generally genuine, for the individuals who experience the ill effects of cardiovascular ailment. Particulates, then again called as environmental particulate issue (PM), or fine particles, are modest particles of strong or fluid suspended in a gas. Expanded degrees of fine particles noticeable all around are connected to wellbeing perils, for example, coronary illness, change lung capacity and causes lung disease. Air contamination is liable for some medical issues in the urban territories. Generally, the air contamination status in Delhi has experienced numerous adjustments as far as the degrees of poisons and the control estimates taken to lessen them. It was evaluated that 3000 metric huge amounts of air toxins were transmitted each day in Delhi, with a significant commitment from vehicular contamination (67%), trailed by coal-based warm power plants (12%). There was a rising pattern in contamination as checked by the Central Pollution Control Board (CPCB). The system comprises of 621 working stations covering 262 urban communities/towns in 29 states and 5 Union Territories of the nation. There are state contamination control sheets (SPCBs), guided and actually helped by CPCB. The Kerala State Pollution Control Board is an assemblage of under Department of Health and Family Welfare. The board is resolved to give contamination free condition to the individuals of state. In any case, right now their checking limits too hardly any locales, which is a significant disadvantage [7].

II. NEED OF MONITORING AIR POLLUTION

Clean air is fundamental requirement for each individual. Polluted air causes numerous medical issues and a few harms. Along these lines to make any progression in front of controlling the contamination rate it is important to monitor the air quality which may assist us with making a correct choice at perfect time. There are different reasons for expanding the contamination, for example, smoke car fumes, concoction release from enterprises, radioactive substance and so forth. These are principle reason of diminishing the nature of air. The primary gases which straightforwardly influence the human wellbeing are carbon monoxide (CO), hydrogen sulfide; sulfur dioxide (SO₂), Nitrogen dioxide (NO₂) and the fundamental commitment of these gases are traffic related toxin emanation. Enormous endeavours are required to improve the nature of air in both outside and indoor condition. Checking of condition has been controlled from manual to the programmed control bit by bit. There are different improvement in the instrument of condition checking yet at the same time can't meet the brutal condition [2].

III. LITERATURE REVIEW

The air and noise pollution monitoring system is fully important for detecting wide selection of gases, also sensors have long life time, easily available, less cost, easy to handle and are compact. Quality of air is often checked indoor also as outdoor. This system has simple drive circuit, works on real time and has visual output. The main objective of this paper is to make sure that the air and noise pollution is monitored and kept on top of things by taking measure accordingly. The proposed paper have certain limitations regarding humidity which should be but ninety-five percent and exact measurement of contaminating gases can't be detected in ppm. This paper is often used for monitoring pollution level and also to stop more than pollution which may cause huge problem in future. This paper gives a thought on how user can give instant aware of the authorities. The cost effective IOT technology is used. Hence air and noise pollution is monitored by using this technology.[1] The motive of creating a sensible city are often fulfilled by using technology, thus making the life better and also enhancing the standard of services, therefore meeting every individual's needs. With modern technology in fields of information and communication, it has become easy to interact with the authorized people of city to tell the where about of the area or city, how well the town is developing and the way to form it possible to realize a far better life quality.

In this system, an application was created to form another step within the fulfilment of the goal. An area is analysed for evaluating what proportion pollution affects the world. The components of gases and their amounts are calculated and checked. If the quantity is above normal then the officials are reported about it. After that the people are made to clear the world and brought to a secure place. The combined network architecture and the interconnecting mechanisms for the accurate estimation of parameters by sensors are being explained and delivery of data through internet is presented [6]. The Automatic Air & Sound management system may be a breakthrough to contribute an answer to the most important threat. The air & sound monitoring system overcomes the matter of the highly-polluted areas which may be a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to watch the quantity of pollution on their mobile phones using the appliance. So, it becomes very reliable and efficient for the Municipal officials alongside the Civilians to watch environment. Letting civilians also involved during this process adds an additional value thereto. As civilians are now equally aware and interested by their environment, this idea of IOT is useful for the welfare of the society. And it's implemented using the newest technology [2]. This IOT based air and sound pollution monitor may be a great step towards a healthy livelihood. With the assistance of this device not only the municipal authorities but even the folk can participate within the process of controlling pollution and ensure safe environment. These automatic devices, once installed are capable of continuously tracking the pollution level and analyse the detected information. The most highlighting feature of this device is that the output is represented in digital also as analog format with the assistance of an easy mobile application which is usable on all android devices like smart phones, tablets, PDA's etc. The device itself is extremely eco-friendly and doesn't harm the environment in any way. Moreover, it's supported one among the fashionable technology and also inexpensive as compared to other technologies developed thus far and may be installed anywhere. [3] For creating the system, first author did the research support the system about IOT and various sensors. Sensors of air and sound supported availability and economical price were selected. For the interaction of internet with the system employing a Wi-Fi module which is connected to the microcontroller through the interface. So, the measured data is shipped from the module to any location with its range from the info are often fetched employing a laptop / mobile [4]. The Automatic Air & Sound management system may be a breakthrough to contribute an answer to the most important threat.

The air & sound monitoring system overcomes the matter of the highly-polluted areas which may be a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to watch the quantity of pollution on their mobile phones using the appliance. To implement this got to deploy the sensor devices within the environment for collecting the info and analysis. By deploying sensor devices within the environment, system can bring the environment into real world i.e. it can interact with other objects through the network. Then the collected data and analysis results are going to be available to the top user through the Wi-Fi. The data are often a crucial source when addressing the difficulty of the impacts of motorcycles at idles (e.g. waiting for a green light) on air quality. Moreover, to realize real-time monitoring, the info of CO concentration during a particular place might be reviewed from mobile communication devices, like PDAs, smart phones, and tablet PCs to help keep air quality in check. [5]

IV. EXISTING SYSTEM

A wireless sensor network (WSN) is an infrastructure comprised of sensing, computing and communication elements that permits the administrator to watch & control of the required parameters within the network. A typical application of WSN includes data collection, monitoring, surveillance & medical telemedicine. It is also utilized in an irrigation system, Greenhouses for monitoring & controlling parameters like water flow, temp, humidity, moisture, etc. In the existing system, there have transmitter and receiver systems using Bluetooth technology. The drawback of this is limited range access.

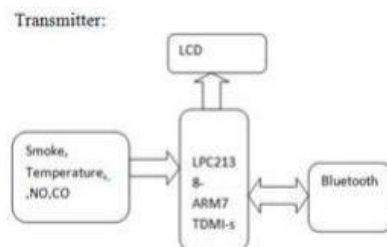


Figure 1 Transmitter

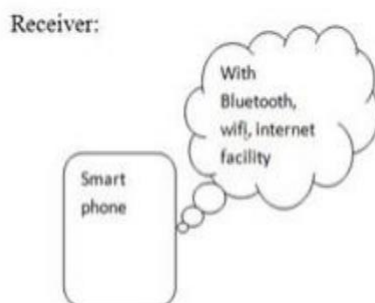


Figure 2 Receiver

V. PROPOSED SYSTEM

5.1 AIR POLLUTION MONITORING EQUIPMENT:

The different components of the equipment along with their intended purpose are discussed below:

5.1.1 Arduino Uno R3 microcontroller

It is the foremost flexible hardware platform used supported ATmega328P which may be programmed consistent with the function where it's to be used. It has 6 analog inputs, 14 digital input/output pins (6 pins of these can be used as PWM outputs), a USB Connection, a 16 MHz quartz crystal, SPI, serial interface, a reset button, a power jack and an ICSP header. The Arduino microcontroller is not only for technical audiences but is intended for designers and artists as well due to its focus to usability supported its design which helps to realize the intended goal [6].

It is the primary component of the framework. In addition, it is an open-source microcontroller device with an easily accessible software/hardware platform and is compatible with many sensors available. Everything needed for its working is present on the board; we only require a USB cable to directly connect it to the computer or give power using the battery source or AC to DC adapter to urge started.

5.1.2 ESP8266 Wi-Fi Module

The ESP8266 Wi-Fi Module is an independent SOC with a coordinated IP convention stack that can give any microcontroller access to your Wi-Fi arrange. Wi-Fi module is able to do either facilitating an application or offloading all Wi-Fi organizing capacities from another application processor. Each ESP8266 module comes pre-customized with an AT order set firmware, which means, we can essentially interface with the Arduino gadget. The ESP8266 module is an amazingly savvy board.

5.1.3 MQ-2 Smoke Sensor

MQ-2 module is utilized in gas spillage distinguishing hardware in family and industry, are appropriate for identifying of LPG, isobutene, propane, methane, liquor, hydrogen and smoke. Because of its high affectability and quick response time, estimation is regularly taken at the earliest opportunity. The affectability of the sensor is regularly balanced by the potentiometer. The MQ2 has an electrochemical sensor, which changes its opposition for various groupings of shifted gasses. The sensor is associated in arrangement with a variable resistor structure a voltage divider circuit and the variable resistor is utilized to change affectability. At the point when one of the above vaporous components interacts with the sensor in the wake of warming, the sensor's opposition changes. The adjustment in the opposition changes the voltage over the sensor, and this voltage can be perused by a microcontroller. The voltage worth can be utilized to discover the opposition of the sensor by knowing the reference voltage and the other resistor's obstruction. The sensor has diverse affectability for various kinds of gasses [8].

5.1.4 Humidity Sensor (DHT 11)

DHT11 is a humidity and temperature sensor, which generates calibrated digital output. It can be interface with any microcontroller like Arduino, Raspberry Pi, etc. And get instantaneous results. It is a low-cost humidity and temperature sensor which provides high reliability and long-term stability. The DHT11 humidity and temperature sensor consists of 3 main components. A resistive type humidity sensor, an NTC thermistor and an 8-bit microcontroller, which converts the analog signals from both the sensors and sends out single digital signal. Humidity sensor has two electrodes with moisture holding substrate between them. As the humidity changes, the conductivity of the substrate changes or the resistance between these electrodes changes. This change in resistance is measured and processed by the IC which makes it ready to be read by a microcontroller.

On the other hand, for measuring temperature these sensors use a NTC temperature sensor or a thermistor. A thermistor is actually a variable resistor that changes its resistance with change of the temperature. These sensors are made by sintering of semi conductive materials such as ceramics or polymers in order to provide larger changes in the resistance with just small changes in temperature. The term NTC means negative temperature coefficient, which means that the resistance decreases with increase of the temperature [9].

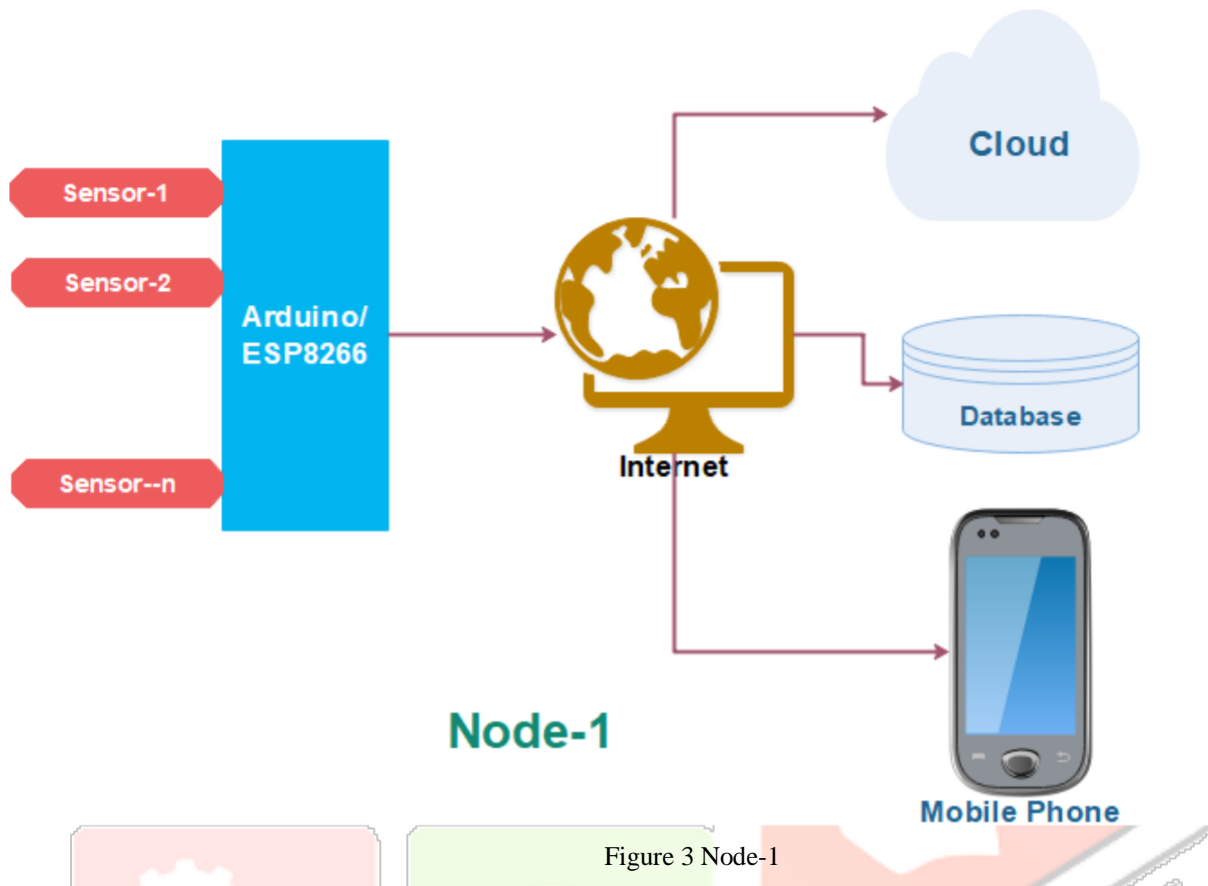


Figure 3 Node-1

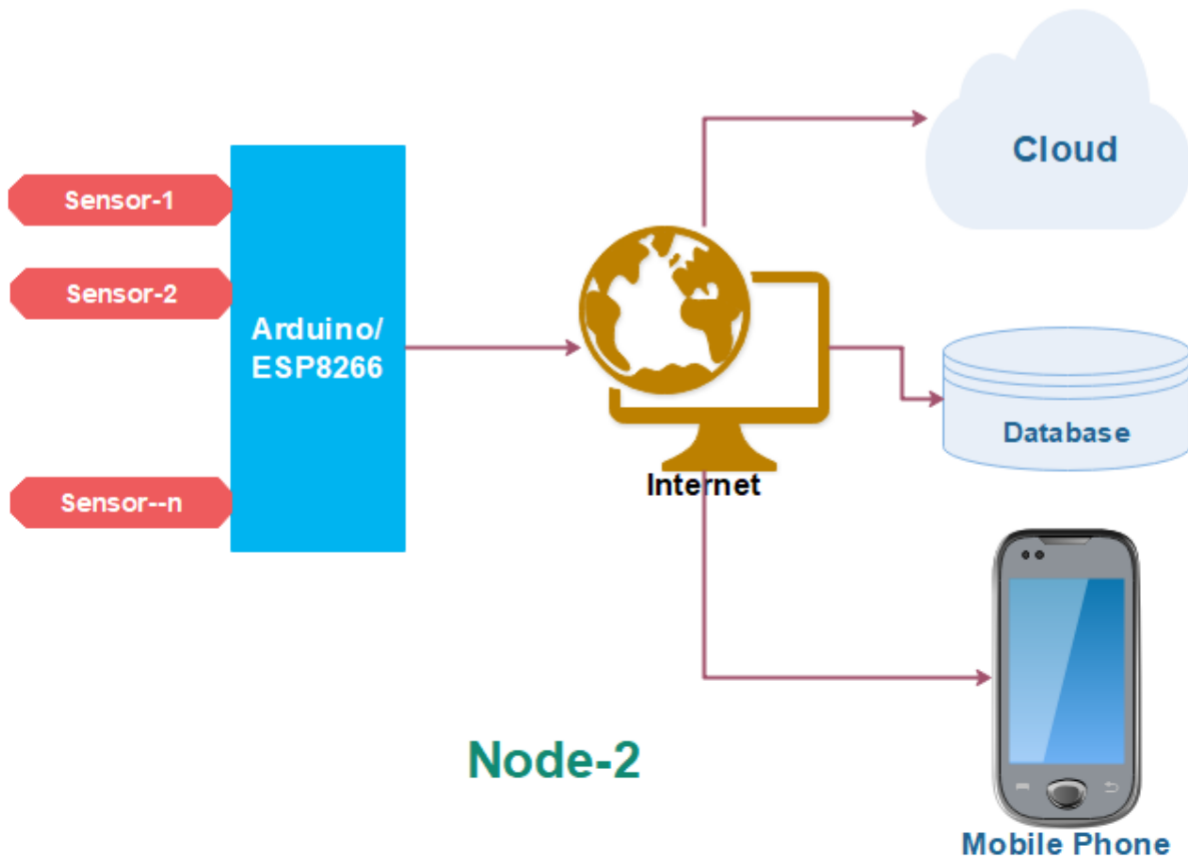


Figure 4 Node-2

Figure 3 shows the connection of different sensors with Arduino microcontroller the Arduino is connected with Internet through Wi-Fi module. The data received from sensor stored on Database as well as Cloud. The data can be displayed on computer and android mobile phone.

The figure 4 also depicted the same but the result will be combined and shows as per the area where module placed.

VI. ACKNOWLEDGEMENT

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VII. CONCLUSION

The framework to screen the demeanor of condition utilizing Arduino microcontroller, IOT Technology is proposed to improve the nature of air. With the utilization of IoT innovation upgrades the way toward checking different parts of the condition, for example, air quality observing issues proposed right now sensor gives the feeling of various sorts of risky gas and Arduino is the core of this task which controls the whole procedure. The Wi-Fi module associates the entire procedure to the web.

REFERENCES

- [1] Dhruvil Shah, Prathmesh Kudale, Prasad Shirwadkar, Samuel Jacob, Iot Based Air and Sound Pollution Supervising System, IOSR Journal of Engineering, 2018.
- [2] Arushi Singh, Divya Pathak, Prachi Pandit, Shruti Patil, Prof. Priti . C. Golar, IOT based Air and Sound Pollution Monitoring System, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, 2017.
- [3] Sindhu.K.G, Shruthi.H, Sumanth.M.B, Vijayashree.H.M, Ayesha.A.P, IOT Based Air and Noise Pollution Monitoring System, International Journal of Innovative Research in Science, Engineering and Technology, 2018.
- [4] Ms. SarikaDeshmukh, Mr . SaurabhSurenran, Prof. M.P. Sardey, Air and Sound Pollution Monitoring System using IoT, International Journal on Recent and Innovation Trends in Computing and Communication, 2017.
- [5] P. Sai Chandana, K. Sreelekha, A. Muni Likith Reddy, M. Anil Kumar Reddy, R. Senthamilselvan, IOT Air And Sound Pollution Monitoring System, International Journal on Applications in Engineering and Technology, 2017.
- [6] Arushi Singh, Divya Pathak, Prachi Pandit, Shruti Patil, Prof. Priti . C. Golar, " IOT based Air and Sound Pollution Monitoring System", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering ((An ISO 3297: 2007 Certified Organization), Vol. 6, Issue 3, March 2017, ISSN (Print): 2320 – 3765 ISSN (Online): 2278 – 8875.
- [7] Akhil Joseph, Amila Ikbal, Anitta V J, Arjun R Krishnan, Neema M, "IoT enabled Air Quality Monitoring and Visualization System", National Conference on Recent Trends in VLSI, Communication and Networks 2018, ISSN: 2454-4248 81 – 84, Volume: 4 Issue: 5, IJFRCSCCE | May 2018, Available @ <http://www.ijfrcsce.org> (Special Issue).
- [8] <http://www.hwsensor.com>.
- [9] http://image.dfrobot.com/image/data/DFR0067/DFR0067_DS_10_en.pdf
- [10] <http://www.airquality.org/air-quality-health/air-quality-pollutants-and-standards>
- [11] https://en.wikipedia.org/wiki/Air_quality_index