AIR POLLUTION DETECTION SYSTEM USING SENSORS

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Abstract: Air pollution results from both natural (e.g., fires, volcanoes, and wind-blown dust) and man-made sources. The particles and gases that comprise air pollution are known to cause adverse health effects in humans. Air pollution is one of the major environmental issues. High population density is a huge contributory factor of air pollution in cities and urbanized areas.

Hazardous chemical compounds break out to the environment through a number of natural and/or anthropogenic sports and may cause destructive results on human fitness and the environment. Increased combustion of fossil fuels inside the remaining century is answerable for the revolutionary change inside the atmospheric composition. Air pollutants, such as carbon monoxide (CO), sulfur dioxide (SO(2)), nitrogen oxides (NOx), volatile organic compounds (VOCs), ozone (O(3)), heavy metals, and respirable particulate matter (PM2.5 and PM10), differ in their chemical composition, reaction properties, emission, time of disintegration and ability to diffuse in long or short distances. Air pollutants have both acute and chronic effects on human fitness, affecting some of special systems and organs. In addition, brief- and long-term exposures have additionally been connected with untimely mortality and decreased life expectancy.

Recent aggressive scientific and technological developments all these focus on a global environmental issue considering air quality system, reveals the fact that India is facing severe health hazards. In recent reports, more than 10 cities in India are listed on top. The air quality index (AQI) inIndia launched in 2014 under Swachh Bharat Abhiyan monitors air pollution on 10 scales ranging from low (green) to moderate (yellow) to serious (red) through data analysis of various air contaminating matters like pm 2.5, O3, NO2, SO2, CO. The present paper develops an Internet of Things (IoT) that enabled air quality monitoring system mobile in nature analyzing real-time surrounding data measuring Carbon Monoxide, Smoke and PPM level. The device can degree nearby area air contamination and generate analyzed records primarily based on which it alerts the humans through a buzzer tool included into the gadget. The consumer-pleasant and smooth coping with of the device generation is such that it can be hooked up in houses.

Keywords: Air Pollution, MQ135 Sensor, IOT, Arduino Uno.

I. INTRODUCTION

Air pollutants refer to any bodily, chemical or organic alternate in the air. It is the infection of air by harmful gases, dirt and smoke which influences plant life, animals and people substantially. There are a sure percentage of gases present in the atmosphere. A growth or decrease inside the composition of these gases is harmful to survival. This imbalance in the gaseous composition has ended in an increase in earth's temperature, that's known as worldwide warming.
Air pollution influences all matters. It is harmful to our fitness, and it affects the surroundings - decreasing visibility and blocking sunlight, inflicting acid rain, and harming forests, natural world, and agriculture. Greenhouse fuel pollutants, the motive of weather change, affect the entire planet. Exposure to excessive tiers of air pollution can reason a selection of unfavorable health outcomes. It increases the risk of breathing infections, coronary heart ailment and lung most cancers. Both brief and long time exposure to air pollutants had been associated with health effects. Air excellent tracking is a topic for lots studies initiatives and network-primarily based tasks. Air quality has become a prime concern for lots towns round the arena. Poor air quality in urban regions can also cause numerous health problems for people who are uncovered to it of their everyday existence.

The essential reasons for terrible air excellent are car exhausts and industrial websites located near city regions. Many

towns have deployed a small range of pricey tracking stations for monitoring air pleasant. However, the deployment of town infrastructures costs a whole lot of time and money. Due to the excessive costs, there are frequently just a few numbers of stations to provide constrained coverage in the town. Recently, research tasks have been carried out to investigate low-fee sensors in order that they can be deployed extra broadly in the town. Here in our gadget we take the actual time pollutant stage from the surroundings and the information is used for the prediction of human health and this information may be saved and can be used for future reference in case if the enterprise or the paintings place is met with any fireplace accident.

II. LITERATURE REVIEW

[1] The level of pollution is growing swiftly due to factors like industries, urbanization, increasing in population, vehicle use that can have an effect on human health. IOT Based Air Pollution Monitoring System is used to reveal the Air Quality over a web server the use of Internet. It will cause an alarm whilst the air first-class goes down beyond a certain level, way while there are sufficient quantity of harmful gases gift within the air like CO2, smoke, alcohol, benzene, NH3 and NOx. It will show the air exceptional in PPM at the LCD and as well as on web site in order that air pollutants may be monitored very effortlessly. The device uses MQ135 and MQ6 sensor for monitoring Air Quality as it detects most harmful gases and may degree their quantity appropriately.

[2] In the populated and growing countries, governments bear in mind the law of air as a first-rate assignment. The meteorological and site visitors factors, burning of fossil fuels, commercial parameters which includes strength plant emissions play huge roles in air pollution. Among all the particulate remember that decide the exceptional of the air, Particulate matter (PM 2.Five) needs extra interest. When its level is high inside the air, it reasons critical troubles on humans's fitness. Hence, controlling it by way of continuously keeping a check on its stage within the air is essential. In this paper, Logistic regression is hired to stumble on whether or not a information pattern is either polluted or no longer polluted. Auto regression is employed to predict destiny values of PM2.5 primarily based on the previous PM2.5 readings. Knowledge of degree of PM2.Five in nearing years, month or week, enables us to reduce its stage to lesser than the damaging range. This system attempts to expect PM2.5 degree and come across air nice based totally on a information set which includes daily atmospheric situations in a selected metropolis.

[3] Traditionally, pollutants measurements are carried out the usage of costly system at fixed places or committed cellular equipment laboratories. This is a rough-grained and high priced approach where the pollutants measurements are few and far in-among. In this paper, we gift a vehicular-based cell method for measuring high-quality-grained air great in actual-time. We advocate cost powerful facts farming fashions – one which may be deployed on public transportation and the second a non-public sensing device. We gift initial prototypes and speak implementation challenges and early experiments.

[4] This study proposes air pollutants monitoring system and evaluation of pollutants data the use of association rule information mining approach. Association rule records mining method pursuits at locating affiliation patterns amongst various parameters. In this paper, association rule mining is offered for finding affiliation styles among numerous air pollution. For this, Apriori set of rules of association rule information mining is used. Apriori is characterized as a stage-through-level complete seek algorithm. This algorithm is applied on records captured with the aid of numerous gas sensors for CO, NO2 and SO2 sensors. As affiliation rule mining can produce several series policies of contaminants, the proposed system layout can enhance the reproducibility, reliability and selectivity of air pollutants sensor output.

[5] Air pollution tracking is although vintage however very beneficial idea in day after day lifestyles. Air pollutants monitoring start from conventional manner to the maximum state-of-the-art pc has been used to reveal the air fine, but the fresh air is essential for all man or women, for that numerous technology has been used and a number of this generation is certainly beneficial so as to offer a real time air fine facts. Aim of this paper is to highlight some era that is used for air pollution monitoring and the way powerful of these technologies are and become aware of the important research on this critical vicinity.

[6] WHO estimates that during 2016, a few fifty eight% of outdoor air pollutants-associated untimely deaths have been because of ischemic coronary heart disease and stroke, even as 18% of deaths were because of chronic obstructive pulmonary sickness and acute lower breathing infections respectively, and six% of deaths were due to lung most cancers.

Air pleasant is measured with the Air Quality Index, or AQI. The AQI works like a thermometer that runs from zero to 500 ranges. However, instead of displaying adjustments in the temperature, the AQI is a way of displaying changes in the amount of pollutants inside the air.

An air nice index (AQI) is used by government groups to speak to the public how polluted the air presently is or how polluted it's far forecast to end up. Public fitness risks growth as the AQI rises.

III. EXISTING SYSTEM

There are no exists exact existing applications of our project. There are some applications that work on air quality monitoring. First and foremost application is predicting the air quality through mobile application- Here in these methodology mobile phones gathers the data from monitoring stations and predicts the pollutants causing damage to human health. But this application doesn't produce the accurate values because there are very less number of air quality monitoring stations are there in cites. eg: Air Care, Air visual, Air Now. This application would fail if there exists a mobile network failure. Second application is based on machine learning algorithms- Here in this methodology user need to have the previous year air quality data and AQI values of pollutants so that by using this data as input to machine learning algorithms user can predict the future risk of inhaling the air. By using this application user get to know the future risk in pollution rate from graphs and can provide the preventive measures. User can submit this predicted AQI report to the forecasting department. But prediction doesn't produce the accurate results and every year there would be drastic change in the population and which results to rise in pollution rate.

Third application is based on real time IoT application. Here in this application measuring real time pollutant values from the environment and results the pollutant values. But in this application major drawback is that the device doesn't provide the preventive measures and health effects. In this application the history of pollutants data is not maintained and only live values are displayed in OLED board.

Problems of Existing System

In the existing solutions real time values are not taken they consider the experimental values or previous year data. The data collected from the sensors is not stored for the future references.

IV. PROPOSED SYSTEM

Here we proposed a system called air pollution monitoring from the sensors as we know that sensors sense the environment and results the value.

Entire system is proposed in three phases-

Phase 1: detect the concentration of air pollutants in the area of interest via sensors.

Phase 2: develop a user-friendly and portable interface – an Android application, which the user can use to know the pollution level in particular area.

Phase 3: predict air quality using the pollutant levels and provide health report.

The model is designed using the IoT technology. It is inexpensive, mobile IoT based Air quality monitoring system which senses the real-time surrounding data with the help of three sensors these are MQ7 gas sensor which is used for sensing carbon monoxide, MQ4 sensor which is used for sensing methane, MQ135 for Ammonia, Sulphide and Benzene steam and DHT11 sensor for Digital Relative Humidity and Temperature Sensor giving readings to ESP32S as a processing unit and sends this detected data to the internet via Blynk Cloud and retrieving data from the cloud to BLYNK app where we can see sensors values.

If there exists the pollutants range crosses the threshold value the user is notified with the buzzer and along with the health notification.
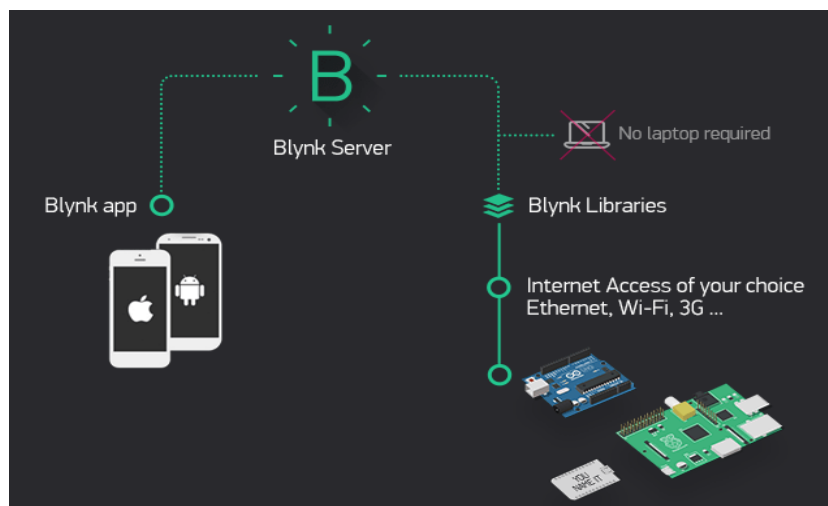

Fig: Proposed System Architecture

Benefits of Proposed System are we provide details description of pollutant effects if user exposed to it. We provide previous and present pollutant recorded values for future references. The equipment is of Low cost, Easy to use and Low Power Consumption. The data can be accessed from anywhere by related who have installed the app.

Algorithm:

An algorithm is a series of instructions, often referred to as a "process," which is to be followed when solving a particular problem while technically not restricted by definition; the word is almost invariably associated with computers, since computer-processed algorithms can tackle much larger problems than a human, much more quickly. Since modern computing uses algorithms much more frequently than at any other point in human history, a field has grown up around their design, analysis, and refinement.

The steps involved in our application are as follows:

Step 1: Start.

Step 2: Sensors sense the information from the physical surroundings.

Step 3: The information collected by the sensors is analyzed by the MCU board and identify the   pollutant levels.

Step 4: The pollutant values are stored in the cloud platform.

Step 5: The app is developed in order to monitor the status of the pollutant at particular place

Step 6: Installation of mobile app.

Step 7: login in to the app using login details.

Step 8: The present status of the pollutant levels in air is displayed in the form of graphs both live and history data is stored in the app.

Step 9: The notification is generated when the pollutant level exceeds the threshold value and notify   with   the health effects

Step 10: The data that is recorded by the app is exported to Gmail for future references.

Step-11: Stop

V. CONCLUSION & FUTURE ENHANCEMENT

The maintenance of all the user health reports, based on the places they live in and can reduce the pollutant based fire accident and can easily identify the pollutant that cause for fire accident we can found it from our records can be reduced such accidents to certain extent through our application . Our application maintains the pollutant levels of different pollutants, so that it can maintain timely readings of each and every pollutant. The application can be accessed from anywhere so that timely health analysis can be maintained by the user through notification.

This application has been successfully computed and was also tested successfully by taking "test cases".

With the system we proposed, we are trying to extend this to the maximum. The scope of the project can further be improved by in many ways. We can add the other details like protein content, presence of cancer cells by integrating into the biochip. Next we can use biochips maintain all the details of a person including government identification, passport etc,. We can add features like doctor suggesting the necessary steps or medication to be taken based on the patient health status in case of an emergency. We can replace the physical storage of health reports into digital format for user convenience, safety and availability.

VI. REFERENCES

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