Abstract

Air pollution is one of the biggest environmental and health challenges in the world today. Air is getting polluted because of release of Toxic gases by industries, vehicular emissi- ons and increased concentration of harmful gases and particulate matter in the atmos- phere. With the massive growth of population and with the increase in the industries and automobiles the atmospheric conditions are considerably descending day by day. Risky effects of pollution can lead to inflammation inside lung which can lead to lung cancer, leukemia, cardiovascular and aggravated asthma. In order to monitoring this project we are going to make an IOT(Internet of Things) based Air Pollution and Human Health Monitoring System in which we are going to monitor the level of pollution over a web server using internet and will make a mobile app that is going to detect the corresponding diseases that may occur for the detected air condition and determine the effects on human health and also may predict the future condition of the health. For developing this project, we are going to use Raspberry Pi as basic device.

Objective

1. Health concern Issue : People will concern about their health and will find a way to live healthy
2. Online Portal : As there is no existing online portal available for Bangladesh so it’s a consummate phenomena for doing this project
3. Reducing disease possibilities : Every year about 4.2 million people die for Air pollution. And the number is increasing day by day. It’s a high chance that through this work we can reduce this possibilities.

Attributes

|  |  |  |  |
| --- | --- | --- | --- |
| **Attributes** | **Health effects** | **Sensors** | **References** |
| PM | Impacts on nervous system, chronic obstructive pulmonary disease,Lung Cancer, Cardiovascular disease , impacts on the reproductive system, Asthma, irritation of eyes, nose and throat | SDS011 | [11] |
| SO2 | Headache, Anxiety,Cardiovascular disease , Asthma, irritation of eyes, nose and throat | SO2 Gas Detector | [13] [14] |
| O3 | Cardiovascular disease , Asthma, irritation of eyes, nose and throat | PIR sensor, VOC sensor, combustible gas sensor | [14] |
| NO2 | Impacts on liver, spleen and blood , Asthma, irritation of eyes, nose and throat | ME3-NO2 | [13] [14] |
| BaP | Lung Cancer , Asthma, irritation of eyes, nose and throat | SM1131 | [15][16] |
| PAHs | Lung Cancer, cardiovascular disease\* | - | [15][16] |
| NOX | Asthma, irritation of eyes, nose and throat | MQ-135 | [5] |
| VOCs | Asthma, irritation of eyes, nose and throat | - | [17][1] |
| Benzene | Leukemia | MQ-135 | [5] |
| CO2 | Headaches, breathing problem | MQ-135 | [5] |
| NH3 | Skin or eye contact,Ingestion,Inhalation | MQ-135 | [5] |
| Smoke | irritating to the eyes, nose, and throat, and its odor may be nauseating, headache | MQ-135 | [5] |
| LPG | irritation in nose and throat, headache and nausea, vomiting, dizziness | MQ-6 | [5] |
| CO | headache, dizziness, vomiting, and nausea | MQ-7 | [7] [8] [11] [12] |

Methodology

Set Up Communication :

1. Sensors will be connected with the core devices (Raspberry Pi).
2. Core device will connected with the local station through a wifi module.
3. A mobile application will set up in the local station (smart device (phone)).
4. Domain and Hosting for the web server database to store the data, also for online portal website.

Working flow :

1. At first sensors will detect the Air pollutants from the environment.
2. And data will be stored in Raspberry Pi for a short time where it will send the data immediately into the local station.
3. Local station will store those data as backup and send it to the online cloud database server.
4. In the server system, we will analyze those data using machine learning and predict the possibility of being a victim for some diseases.
5. Also we will build an online portal to show different areas data.
6. People can access the portal and predicted result through any smart devices with the help of web.

Related Work

In two different seasons if the fossil fuel and biomass are burned in domestic area, the symptoms and impacts are being observed in children. And have come in to a conclusion that the indoor air pollution is not only responsible for those impacts. The other factors are also comprised here.[1] In urban and rural areas, the possible differences between indoor IQA are being investigated and they were detecting the respiratory and non-respiratory effects on the children. As a result, it is observed that in urban area the IAQ is lower than the rural area. But they could not find out the respiratory symptoms of the attributes. It has possibilities that the other factors may be responsible for those symptoms[2]. It’s not only about the children illness also its about the all human beings. Vehicle also plays an effective role in this pollution[10].

Now when its about monitoring those air pollutants, there are a lot of rave journals already published in monitoring the air pollutants. The wordsmiths [5] proposed a system which can detect some of those air pollutants from air with some IOT (internet of things) devices. Like MQ 135 sensors can detect CO2, C6H6, NO2, SMOKE, NOx, LPG, alcohol, MQ-05 can detect Sulphur Dioxide[5][6], MQ-07 can detect Carbon Monoxide[7] and MQ-06 can detect LPG[5]. Particularly those devices gave the output in voltage format. They converted those data into PPM using the default build in function of those sensors. And for core devices where all the sensors and other IOT devices were connected to each other was Arduino Uno. Where the other wordsmith of [9] used Raspberry Pi and it is more consummate then Arduino. Zigbee module is used for wireless communication in [8] where in [5] they used Wi-Fi module ESP8266 for transmitted the data into local station. They [7] also provided the air pollutants data into table format where they separated the source area widely and in [8] the wordsmiths showed the graph of those pollutants air monitoring individually. But only [6] and [8] proposed the online server system to store the data using cloud system.

Summary

We propound an air pollution monitoring system which allows us to monitor the con-

dition of pollution and detect corresponding diseases through IOT. Our system also

will keep on measuring the level of increase or decrease of pollution interacting the

sensors with Raspberry Pi which will process the data and transmit them over the

application. And for being able to control it with the help of mobile application it will

be really easy to use and helpful.

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