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IOT BASED AIR PURIFIER WITH POLLUTION MONITORING SYSTEM

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ABSTRACT — *As we know, air pollution is one of the most serious environmental problems in the 21st century. It increases rapidly day to day by many reason. There are many reasons due to which air pollution causes in the world. The main reason of the air pollution is human beings, there are many manmade things due to which air pollution causes such as vehicles, chimney, nuclear power plant, deforestation etc. but also there are some natural reason due to which air pollution causes such as volcanic eruption, increasing temperature, wildfire etc. In air pollution, there are some harmful gases like CO2, NO2, SO2, dioxins etc. which affect the body parts of the human being in different way and also there are particulate matter in the air which affect human beings. As per WHO statics, several premature death cases are reported due to air pollution every year worldwide. Thus, we have made a device named as "IOT based Air purifier with Pollution monitoring system". It detects the harmful gases and dust particles which are present in air and also tells about the temperature and humidity for that we are using DHT11 temperature and humidity sensor. After detection, it sends the data to the LCD and ThingSpeak cloud server using Wi-Fi module (Esp8266-01). Thingspeak cloud server is an open-source cloud platform on which data can be stored and retrieved via HTTP over the internet. If the data is low then it only sends the data to the LCD and ThingSpeak but if the data is high then it sends the data to the LCD and ThingSpeak cloud server as well as it starts the fan which start purifying the air through HEPA filter. This device allows the monitoring of air quality, also purify it and show the real time results on the cloud server.*

Keywords: Internet of Things (IOT), Air Quality, Purifying the Air, ThingSpeak, Wi-Fi module.

I. INTRODUCTION

Air pollution is maybe one among the most serious environmental problems facing our civilization today. In large number of cases, it's caused by human activities like deforestation, mining, construction, transportation, industrial work etc. But also there are natural process like volcanic eruptions and wildfires pollute the air but their occurrence

is rare and that they usually have a local effect, but the human activities that are at every places causes of air pollution and that they contribute to the worldwide pollution of the air every single day. Within the most cases, air pollution cannot be seen or smelled. However, that doesn't mean that they are doing not exist in high enough amounts. Four of the most striking air pollutants like Sulphur Dioxide (SO2),Oxides of Nitrogen as NO2 [1] .The statistics is shown in Figure 1.According to The Lancet report, air pollution was the biggest contributor, linked to 6.5million deaths in 2015, ahead of water pollution (1.8 million) and workplace-related pollution (0.8 million) [4]. Impure air may result in headache, respiratory problems and death sometimes. Hence, we came up with "I2P (Impure to Pure) Air Purifier" with Air Quality Monitoring Device [2] .So, we've made an IOT based Air Purifier with Pollution Monitoring System. It requires the live data transfer between the device over the cloud and it may be visualized using an Android Application, having a wide range of specifications. It gathers the data from various sensors via an inbuilt Wi-Fi module. The data will also send to the ThingSpeak cloud server, an open source cloud platform on which data can be stored and retrieved via HTTP over the web. ThingSpeak cloud server acts as a platform to store real time sensor data and also used to plot graphs, charts and other application program interface (API). Once signed in a channel is made with a unique channel ID. The primary features of ThingSpeak cloud server is that the term channel during which there are several fields to store latitude and longitude and elevation and one field to write down a brief message to explain the data. Thus, in order to realize efficient IOT accomplishment for an application; the correct sensing and monitoring system is essential. The device can communicate with one another via machine to machine communication and also the physical devices may be controlled digitally. So, an IOT based motoring system may be one possible solution.

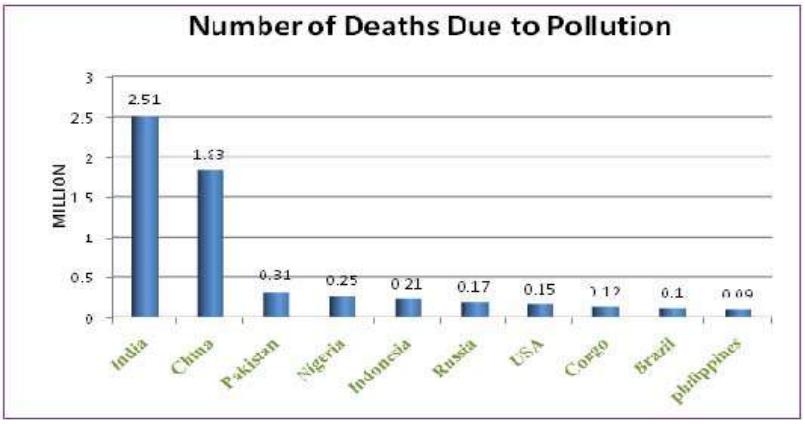

Figure 1:- Statistics of death due to air pollution [4]

II. PROPOSED OBJECTIVE

The main objective of our project is to make low cost IOT based air purifier with air monitoring System. As we know that, in present the quality of air in the environment is not very good and in some area of our country. A lot of respiratory ailments like asthma, bronchitis and even lung cancer are caused due to the presence of certain pollutants in air. Indoor air quality has been receiving a steady attention not only from the mob, but also from the international

scientific community, in the past few decades[1]. Some company made the air purifier which cost is very high, so middle class family or poor family are not able to buy that air purifier. Our aim is to make a device which tells us about the quality of air surrounding us and also purify the air. We have used sensors who tells the quality of air and also about the dust particle which is approx. of 0.3 micron. The budget of our project is cheap comparison to other air purifiers and it is very simple to install at any place and anyone can use it very simply. Our project also tells the quality of gases in the environment and also about the AQI level. It is table in which different type of stage of quality of air are mention:

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects.

Figure 2: AQI Level [10]

III. METHODOLOGY

As we supply the power to the microcontroller the MQ135 & SHARP GP2Y1010AU0F Dust sensor will start sensing the harmful gases and dust particle around us and after sensing the data the sensors send the data by using ESP8266-01 Wi – Fi module to the ThingSpeak. The data will also show on the LCD as we coding in our project. As the data is in the dangerous region then it will visualize on the ThingSpeak page. And if the data is in above or equal to moderate region then our fan will start and purifying our surrounding region as their capability. The data will again send by the ESP8266-01 Wi-Fi module to the ThingSpeak and if the data is in safe region then the fan will stop and this process will repeat again & again.

IV. BLOCK DIAGRAM

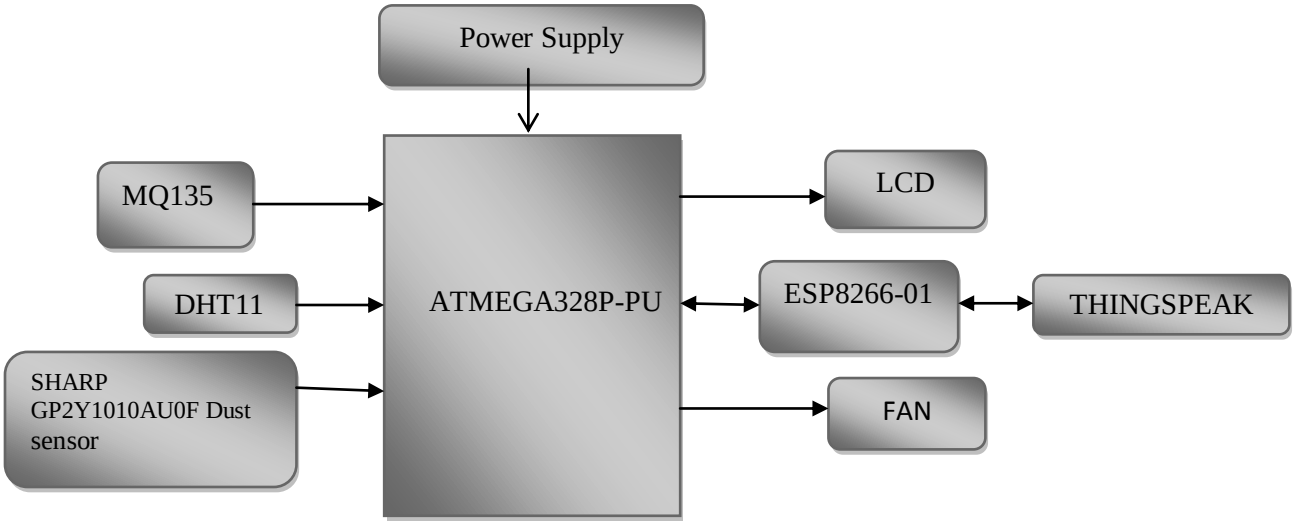

Figure 3: Block Diagram

VI. ADVANTAGES

- Sensors are easily available.
- Detecting a wide range of dust and gases, including PM2.5, alcohol, benzene, smoke, CO2, NH3 and NOx etc.
- Sensors have long life time & less cost.
- Operating voltage: 5 -12 volt.
- Indoor quality of air can be checked.
- Visual output.
- Continuous update of change in PPM .

VII. APPLICATIONS

- Indoor Air Quality Monitoring.
- To make this data available to the common man.
- Site selection for reference monitoring stations THINGSPEAK
- It absorbs different gases and dust particle.
- It indicate the data of our surrounding temperature and humidity.

VIII. RESULT

Figure 5: Hardware System of IOT based Air Purifier with Pollution Mointering System

It tells us about the harmful gases which is present in air around us. This device take all the value of dust particle as well as all other gases present in surrounding are represented in digital from as well as in graphical from and show the AQI value by which we can determine the quality of air. If the AQI value is greater then standard value then we can say that air around us is polluted.

It tells us about the data of temperature and humidity present in surrounding which are represented in digital from as well as in graphical from. If the temperature value is increased then humidity is decreased.

IX. CONCLUSION

Here, we have come to the end of the project on the "IOT based air purifier with pollution monitoring system." It was a wonderful learning experience for us while working on this project. This project gave us real insight into the pollution which increases daily in the world. In this project, we have successfully monitored the parameter of air and also purified the air pollution. We learnt a lot from this project and we are very thankful to our guide who helps us a lot while making this project. We enjoyed each and every bit of work we had put into this project. Thank you.

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