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Air Quality Monitoring System for Smart Home

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***Abstract:** Air pollution is getting worse day by day in the developing world. Air pollution causes various harmful diseases which affects the immune system of human body whether they are living outside or inside the home . This project is mainly proposed for monitoring the air pollutants and harmful gases inside the home with the help of IOT. Nowadays there is high demand of industrial automation which makes the market very competitive. Hence, in this system low powered and affordable sensing materials like humidity and temperature sensor, lpg gas sensor etc. are used for monitoring. These sensors can monitor wirelessly through wireless devices with the help of IOT where sending and receiving of data can be done through internet. With the help of this system user can know the environmental air of home is polluted or not. These thing can be done mainly using Arduino uno and the web servers where user can see the data on dashboard outside the home. As there are many air quality measuring system in the market, in this system there is no need of human interaction .Various thing can be done automatically without human interaction like maintaining humidity and removing leaking lpg gas . Main goal is that to make this system affordable and automatic that it will do many things on behalf of human.*

I. INTRODUCTION

Nowadays in high tech condition, air pollution has become one of the major environmental problem both in outdoors and indoors of daily life.It is affecting everyone's health in day to day life. That's why , air pollution is a problem of growing importance. Air pollution also affects the nature condition in bad way. Due to which global warming, global dimming ,drought and various other things are happening. There is rising in the rate of people becoming sick in day to day life. Every living being on the planet are suffering due to the effect of air pollution.

The gases which is playing important role in this problem is carbon dioxide, carbon monoxide, lpg gases mixture, humidity. Humidity plays an important role for causing air pollution by increasing the density level of air pollutants. Due to global warming there is rise in temperature which makes difficult for natural air currents to dissipate the air pollutants. In the fast pace living life of human being ,human starts to neglect the after effects of the air pollution .That's why there is a need of system which actually maintain the data over the level of pollutants and gases in daily life of human . This system mainly focus on researching the serious issue of air pollution and to estimate the air quality. Mainly it gives data on Co2,LPG,temperature,humidity. With the help of Arduino along with the server the reading of data become possible.

Industrial internet of things is use of various sensors for further improvement of quality in manufacturing and industrial process. The main philosophy behind the IIOT is that systems can easily and accurately captures the data in real time .This machines can easily transmit and receive data in better way which can be used to run and maintain business decision quickly. Companies can easily find fault and inefficiencies if something happen in system by analysing the connected sensors and actuators.Due to this time and money can be save which supports business intelligence efforts. As there is increment in profitability of company IIOT are more widely adopted .

WSN oftenly known as wireless sensor network, which consist of various sensors which are used to check the physical condition of environment and stores the data at particular location. WSN is the key ingredient in growing internet of things. WSN are expected to be integrated into the IOT, where sensors nodes join the internet dynamically and use it to collaborate and accomplish their task. GAS sensors are made up from the semiconductor material which attracts the interest of various researchers. Various integrated sensor are present to get the real time value of temperature and humidity. Organisation which are using IOT are delivering good customer services and there is increment in the decision making process .Various benefits of monitoring system in business are that it can reduce the energy waste and consumption and it can also manipulate the mechanical and electrical system of various organisation. As organisation are growing day by day it may eventually need large numbers of devices which works on the IOT, at that time management of data will become challenging. This system can be further improved with the use of several emerging IOT standard like IPv6,zigbee , liteos etc.

II. LITERATURE SURVEY

Internet of things is a new emerging low cost technology. In Wireless monitoring of air pollution in real time the author has described a low-cost wireless system which is developed to calculate CO2,CO and the density of dust particles based on multiple layer distributed algorithm with an Arduino based platform. The data is collected and monitored on controller and sent to web page to analyse the air pollution parameters in real-time. This is bit complex as they have implemented various kinds of software languages for different processes. In IOT-based Air pollution Monitoring system the author convey the idea of IOT based air monitoring and forecasting system. The senors installed in this system are C02,dust particle (air quality),LPG, temperature and humidity sensors. This system can be implemented on a large scale in monitoring area to construct a monitoring sensor network. Data-sets of various sensors parameters like MQ5,MQ135,Temperature and Humidity is detected by the Sensors. GSM module is installed to connect the system with the server via web services. Various sensors are interfaced with the system to measure the mostly detectable air pollutants such as CO2,CO etc. The measured data is displayed on the LCD display using the graphical user interface (GUI). The pollutants detected will be stored on data based server to display real time pollutants levels. The real time monitoring system has installed sensors for sensing concentration of gases like CO2, NO2, CO and LPG gas. For establishing wireless communication node MCU module is used,it consists of communication and processing unit. The packets of gathered data are made and sent to the base station.To inspect this pollution data in the form of numerical values and charts from anywhere on internet a web interfacer is used. This system consumes low energy. Various sensors used in the system collect the pollution data sets which the sent to the central sever that makes the data to the user and analyse the data take preventive measures.The data is analysed compared with the quality standards. The system uses the air quality index to judge the level of health concern for certain area. The pollutant levels are seen and compared with the standard value and measure can be taken.

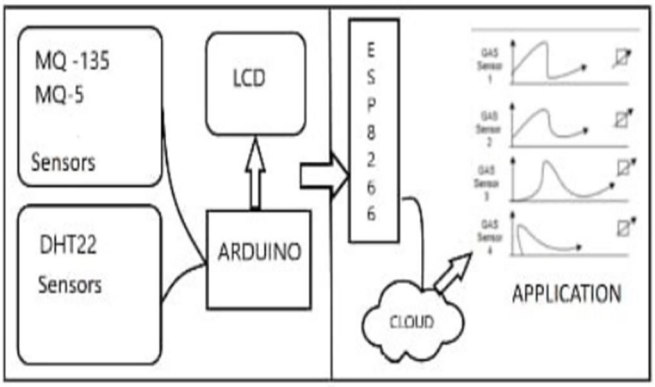
According to the analysis of WHO, from smog hanging over the large cities to smoke inside the home, air pollution is becoming a serious threat to the health and climate. The effects of outdoor and indoor together results about 7 Million prematue deaths every year all over the world, due to increased mortality from strokes ,heart diseases, chorinic obstructive diseases, lung cancer and respiratory infections. More than half people living in urban areas are exposed to bad air quality levels. Vehicles, power generators, building heating systems, agriculture waste and industries contribute highly to outdoor air pollution. More than a billion people across the world depend upon the pollution causing technologies for household, heating, lighting which promoted indoor pollution and their waste are dumped outdoor.8 out of 10 people today breathe polluted air. Green energy solutions should be adopted over the conventional energy sources to control the air pollution.so the moto to make such a system to let people that how much amount of toxics are inhaled by them. This device is easy to install and helps to monitor the pollution levels.

III. PROPOSED METHODOLOGY

The proposed system includes IOT and wireless commuinication technology to attain better communication and to establish better sensing .For real-time sensing the system refreshes every 15 seconds and gives accurate readings of the pollution levels. The reading contribute to a data-set which helps to monitor the environmental air-pollution levels. The data sets can be visulaized using IOT gateway. NodeMCU is a low-cost IOT device.Node MCU esp8266 which is used to establish wireless communication between system and internet is open-source module in which open source prototyping board designs are available.The term MCU describes micro-controller-unit. This data sets can be used to optimize the surrounding by using appropriate air filters. The system simultaneously checks for LPG gas if their is any leakage of the gas.In that condition it will automatically turn on the exhaust fan and will clear the gas and secure the user from accidents. In addition to make the system cost effective and accurate in the above system,both software and hardware part are installed in such a format that IOT and WSN technology will give good responses. In this system the server which are to be used are provided ThingSpeak. According to its developers, "ThingSpeak is an open-source Internet of Things application and API to store and retrieve data from things using the HTTP and MQTT protocol over the Internet or via a Local Area Network.

As indicated by the University of Rochester Medical Center, heaters can possibly discharge carbon monoxide into the home. Carbon monoxide is dull and scentless and can conceivably be lethal. Regardless of whether the levels discharged are not sufficiently high to be lethal, it can at present produce genuine sickness. In the event that a focal AC unit isn't working accurately and there is a fragmented ignition of the energizes, carbon monoxide harming is a hazardous chance.

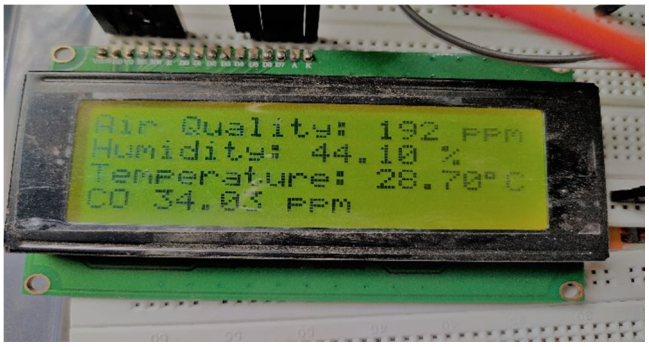
In the future ,for further purpose there are many upgrade processes are available for this system.Just like adding various other sensors that can be used for detecting various other gases.For this thing various types of sensors are available in market.And, as technology is increasing different types of platforms are also upgrading.This system can also be implemented on other platform by using different ideas.



Block Diagram

Flowchart

IV. EXPERIMENTAL RESULTS



V. CONCLUSION

A new smart and innovative way to monitor environmental air pollution being a low cost and also very efficient.In the proposed system functions of diferent sensors and their working processes are discussed.How they work,their functionality,their use and their data obtaining process are taken into account.The air pollution monitoring system was developed for monitoring the gas levels in the surrounding.It also sends the tested data to the data server.This data will be a key factor to take some necessary steps to secure the living environment inside houses as it will identify the harmful gases and reduce damage to the future generations.This device can be used anywhere,anytime at various location in the city and it is reliable one.The device can be updated with various sensors and air purifiers.Android app can be developed for the same and more updations and advancements are possible.

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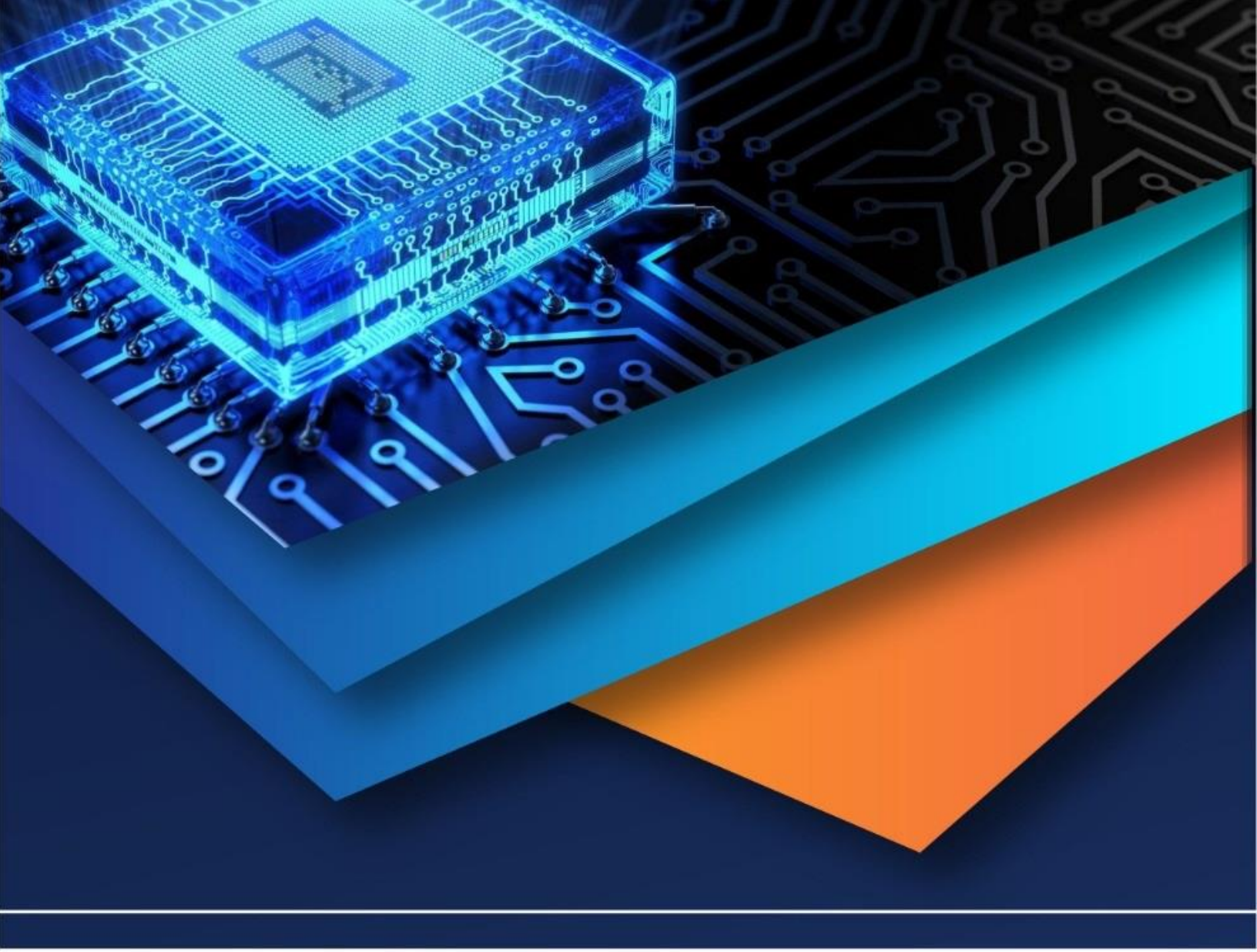

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