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City Air Pollution Tracker

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Abstract: ***The level of pollution has increased with times by lot of factors like the increase in population, increased vehicle use, industrialization and urbanization which results in harmful effects on human wellbeing by directly affecting health of population exposed to it. In this project we are going to make an IOT Based "City Air Pollution Tracker", in which we will track the air quality level by using various sensors,microcontroller and internet that will trigger alarm when the air quality goes beyond a certain level, means when there are sufficient large amount of harmful gases present in the air like CO 2, smoke, alcohol, benzene and NH3. It will show the air quality on the thingspeak cloud in tables and charts form so that it can be monitored very easily. In this IOT project, you can track and monitor the pollution level from anywhere using your computer or mobile. By using the air pollution tracker the amount and type of pollution that is causing harm to the environment will be detected for the particular area where the tracker is present and that will be displayed on the Map using the colors scheme.***
Keywords: Air pollution, sound pollution, IOT, sensors.

I. INTRODUCTION

The Air and Sound Pollution is a growing issue these days. It is necessary to monitor the Air and Sound Pollution levels to ensure a healthy and Safe Environment. With the rapid increase in the Infrastructure and Industrial plants, environmental issue have greatly influenced the need of Smart Monitoring Systems. Due to its low cost high Efficiency and Versatility, Internet of Things (IOT) has become a very popular now a days. So the Internet of Things allows the interaction between the Devices and the Humans. It forms a Communication Medium from Human to Machine. Previously, Data Collectors had to travel long distances to the various locations to collect data after which the analysis was done. This was a very lengthy and a time consuming process. But now the Sensors and Microcontrollers connected to the internet can make the Environmental Parameter Monitoring more Flexible, Accurate and less time consuming. When the Environment Merges with the Sensors and Devices to Self-Protect and Self-Monitor it forms a Smart Environment. In this model we are using Arduino which is a Microcontroller and we have some Air pollution sensors and a Sound pollution sensor connected to it to track the Fluctuating Environment Parameters.

II. RELATED WORK

The author Vasim K. Ustad , .A.S.Mali , Suhas S.Kibile has proposed the system to monitor pollution using wireless sensor network (WSN) . The proposed system consists of a Mobile Data-Acquisition Unit (MobileDAQ) and a fixed Internet-Enabled Pollution Monitoring Server. The Mobile-DAQ unit integrates a single-chip microcontroller, air pollution sensors array, and Global Positioning System Module (GPS Module). The Pollution-Server is a high-end personal computer application server with Internet connectivity.

The Central-Server is interfaced to Google Maps to display the location of hardware unit. We can connect database server to the Pollution- Server for storing the pollutants level for further usage by various clients such as environment protection agencies, vehicles registration authorities, and tourist and insurance companies.

The author R.Sowmya, M.Premkumar has developed the system for detection and communication of various pollutant concentrations such as nitrogen dioxide, sulphur dioxide, carbon monoxide, carbon dioxide takes places in real time. The pollution monitoring system consists of a single chip microcontroller, air pollution sensor array and GPS module which are integrated and communicated through GSM Transceiver. Finally it display through PC for real-time monitoring.

The author Anwesha Mitra, Aishwarya Chatterjee has proposed an IOT-based system which is used to monitor the Air Quality Index and the Noise Intensity of a region.

The recommended technology comprises of four modules namely, the Air Quality Index Monitoring Module, the Sound Intensity Detection Module, the Cloud-based Monitoring Module and the Anomaly Notification Module. The Air Quality Index is measured considering the presence of the five criteria air pollutants. Then the sound intensity is detected using respective sensor. After that, the Cloud-based Monitoring Module ensures the process of acquiring the data with the help of Wi-fi-module present in Raspberry Pi which fulfils the objective of analysis of information on a periodical basis. Finally, the Anomaly Notification Module alerts the user in case of an undesired condition.

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III.ARCHITECTURE

This system is made to fulfil the purpose and need of the society to monitor and check the live air quality and sound pollution in an area through IOT. In this system there are two different gas sensors used that will detect different gases and the level of the gases and there is also a noise position sensor that is used to give us the noise pollution level in DB scale.Pm2.4 sensor is also used which is used to detect the particular matter dust from the environment.DHT11 sensor is used for calculating the temperature of the surrounding. This sensors then interact with the microcontroller .Microcontroller is the heart of a system. As a microcontroller we have used Arduino uno that has a 28 pin on it with 14 digital and 6 analogue pins .A system will be connected to the internet via the wi-fi module which will give us the access to our database which is on the cloud.The LCD will display the data of temperature ,noise and sound pollution.All the data will be stored on the thingspeak cloud and displayed in tables and charts format .From cloud the collected data is further analysed and then graphically displayed or represented on map. And whenever the air pollution is highly detected, a buzzer immediately beeps continuously. With this system not only the authorities but also the localized people can check the data through their mobile phone and that too without spending single penny and the people can act against it on their increased level and try to bring the pollution level under control. This system would contribute as a part in the building of a healthy society.

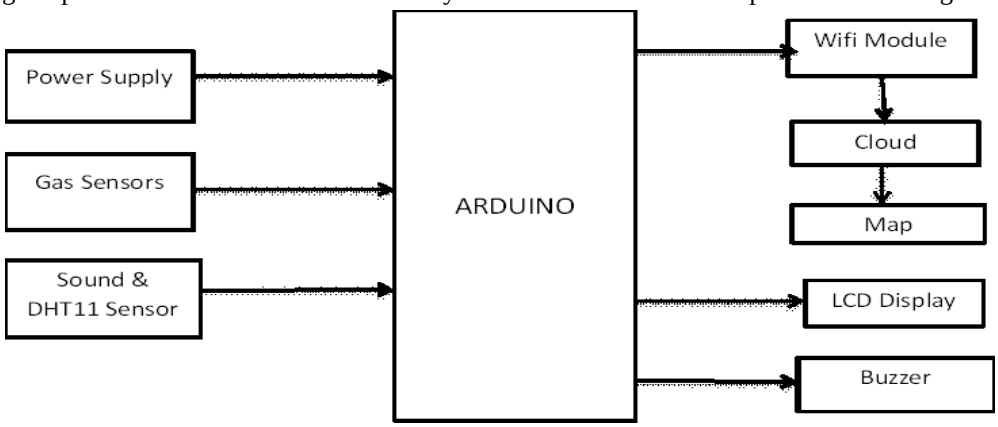


Fig: Block Diagram

IV.MODULES

A. Arduino

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits.The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE via a type B USB cable.It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software(IDE) 1.0.The Uno board and version 1.0 of Arduino Software(IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards,and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

B. MQ-7

This is a simple-to-use Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can detect CO-gas concentrations anywhere from 20 to 2000ppm.This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

C. MQ-135

They are used in air quality control equipment for buildings/offices, are suitable for detecting of NH3,NOx, alcohol, Benzene, smoke,CO2 ,etc.

D. DHT-11

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high performance 8-bit microcontroller, o□ering excellent quality, fast response, anti-interference ability and cost-e□ectiveness

E. PM -2.5

Particulate matter the term for a mixture of solid particles and liquid droplets found in the air.They are used to detect the micrometer sized particulate from environment.

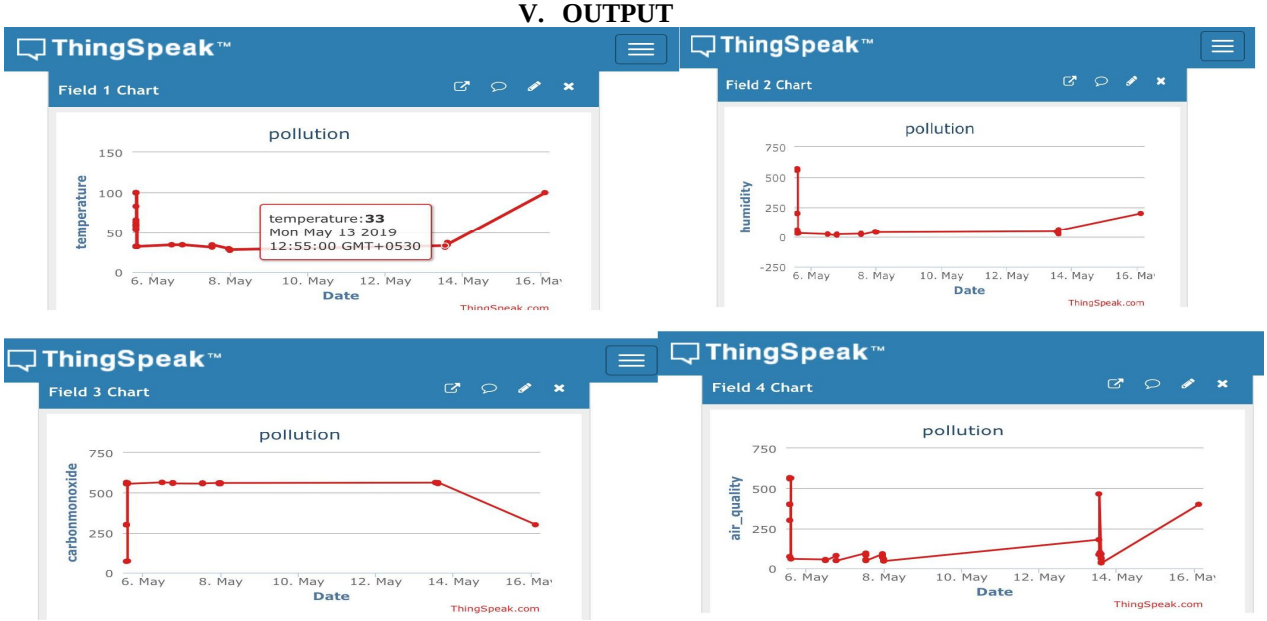
F. VMA-309

High sensitivity sound detection module with 2 outputs Analogue output, real-time output voltage signal of the microphone. The digital output depends on the sound intensity and the threshold that has been set.

G. Thing Speak

It is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. Thing Speak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates .Things Speak. Thing Speak is an "Application Programming Interface" (API) and web service for the "Internet of Things" (IoT). The Thing Speak API is an open source interface which listens to incoming data, timestamps it, and outputs it for both human users and machines.

V. OUTPUT



VI. CONCLUSIONS

The proposed Air Pollution Tracking System provides Real-Time Information about the level of the pollution in a particular area. It will show the different types of Air Pollution in that Area and the Sound Pollution will also be displayed as well. In case there is a drastic change in the quality of the Air it will give Alerts. This information will be then displayed on a map and it can be further used by the authorities or people to take necessary actions against this.

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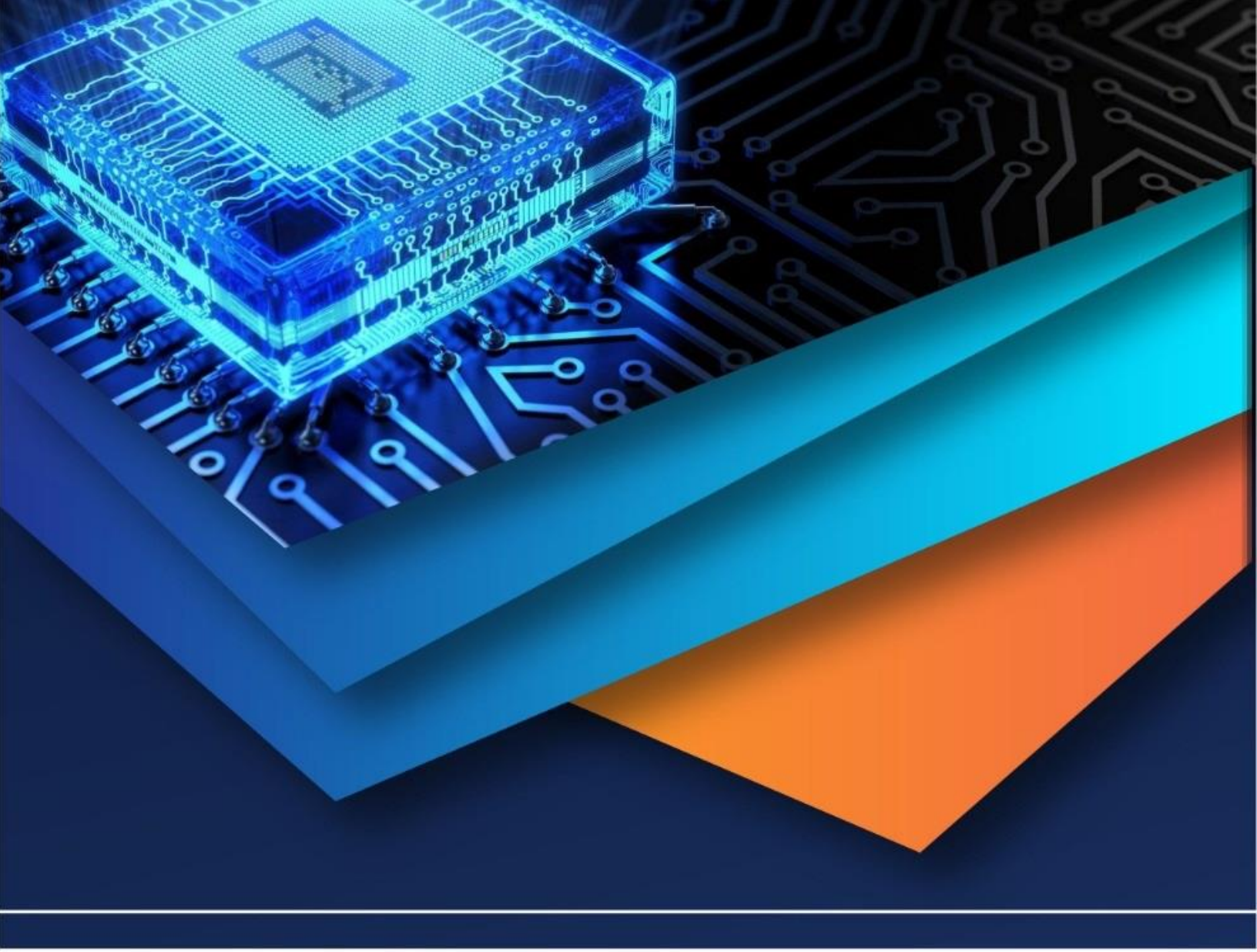

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