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Real Time Indoor Air Quality Monitoring System

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Abstract: Major of the time about 2/3rd of the day we humans spend indoor. So it is necessary to keep our indoor environment clean and healthy. As air quality has major influence on the health of people so this A Wi-Fi Based, Multi-Sensor, Real Time Indoor Air Quality Monitoring System is proposed. The system will detect the level of the several gases like Carbon Dioxide (CO_2), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), and Volatile Organic Compound (VOC) and also the presence of dust, temperature, and humidity. The system will alert the user if levels of these gases are exceeded through Wi-Fi and Bluetooth module on their smartphones. The system consists of Arduino platform and multiple sensors along with Wi-Fi and Bluetooth module. The Wi-Fi and Bluetooth modules are used to communicate with the user.

Keywords: Arduino, Wi-Fi, Bluetooth, Sensors, Temperature.

1. INTRODUCTION

Air quality is one of the major environmental and health concerns in big cities. Air pollutants are attributed to natural or man-made sources and may take the form of solid particles, liquid droplets or gases. We humans spend 80% time indoor where indoor air can be 2-5 times worse than outdoor air. In order to live clean and healthy indoor lifestyle, our indoor environment should be pollutant free.
Indoor air gets polluted due to various pollutants like second-hand smoke it is tobacco smoke which affects other people other than active smoker, Radon is an invisible, radioactive atomic gas that results from the radioactive decay of radium, which may be found in rock formations beneath buildings or in certain buildings materials themselves, molds and other allergens are biological chemicals can arise from host of means, but there are two common classes (a) moisture induced growth of mold colonies and (b) natural substances released into the air such as animal dander and plant pollen and mold is always associated with moisture, carbon monoxide is colorless, odorless gas that is a byproduct of incomplete combustion of fossil fuels and other source is tobacco smoke also. VOCs include a variety of chemicals, some of which may have adverse health effects which are emitted as gases from certain solids or liquids: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials [8].

So these pollutants hazardous to our health need to be monitored and also to take appropriate measures to control indoor air quality getting deteriorated. We have proposed an indoor air quality monitoring system which monitors the levels of various harmful gases and pollutants and alert the user through Wi-Fi or Bluetooth on their smartphones giving notifications and respective preventive measures. This system is based on Arduino board, is an open source which sense and control physical devices. The various sensors are attached to board to sense temperature, humidity, dust particles, and many harmful gases including CO_2, SO_2, NO_2, CO, etc. This data will be processed and will check the limits that can harm human health and will alert the user through Wi-Fi or Bluetooth module attached to board. User will get notifications on their smartphones about indoor air quality and to take preventive measures appropriately. The history data can also be obtained through cloud.

2. LITERATURE SURVEY

Air Sniffer: A Smartphone-Based Sensor System for Body Area Climate and Air Quality Monitoring: -Where it is given that Air Sniffer, a smartphone-based sensor system, which can be conveniently used for personal body area micro-climate monitoring. The sensor node is implemented with a popular Arduino prototyping board, a Bluetooth module, and a number of low-cost micro sensors. Overall system architecture and the detailed system design.

Indoor Air Quality Monitoring through Software Defined Infrastructures: - Including that a prototype of a Wireless Sensor Node along with a Software Defined Infrastructure to monitor the quality of the air in different indoor area Specifically, a number of wireless nodes are deployed in different classrooms. A number of relay nodes forward the data to a vCPE, which delivers the data to a Smart Edge. In the vCPE and the Smart Edge, a monitoring and analytic system, called Monarch, is used for collection, storage and analytic purposes of the monitoring data.
Air-Kare: A Wi-Fi Based, Multi-Sensor, Real-Time Indoor Air Quality Monitor: - Which consists of a portable, real-time, wireless indoor air monitoring system is designed using the Arduino Yun platform. Because of the importance of a clean indoor environment on human health, the proposed prototype is designed to monitor the

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temperature, humidity, volatile organic compounds (VOCs) and miniature dust particles. The Arduino Yun platform incorporates an MCU that acquires and sends the data to a Wi-Fi chipset, serving as the communication bridge between the server and clients.

Smart Room Monitoring through Wireless Sensor Networks in Software Defined Infrastructures: - Gives information about Software-Defined Infrastructure (SDI) provides a unified framework for managing heterogeneous virtualized resources in cloud infrastructures. In this paper, we demonstrate the design of our monitoring system called Monarch that tackles the above challenge in a smart room infrastructure. A real time wireless ad-hoc sensor network system for carbon dioxide monitoring at a complex indoor environment is supported. The system aims to detect and monitor the level of carbon dioxide on a real-time basis.

An Integrated Sensing Systems for Real-Time Indoor Air Quality Monitoring: - Where it examines the issues, infrastructure, information processing, and challenges of designing and implementing an integrated sensing system for real-time indoor air quality monitoring. The system aims to detect the level of seven gases, ozone (O_3), particulate matter, carbon monoxide (CO), nitrogen oxides (NO_2), sulfur dioxide (SO_2), volatile organic compound, and carbon dioxide (CO_2), on a real-time basis and provides overall air quality alert timely.

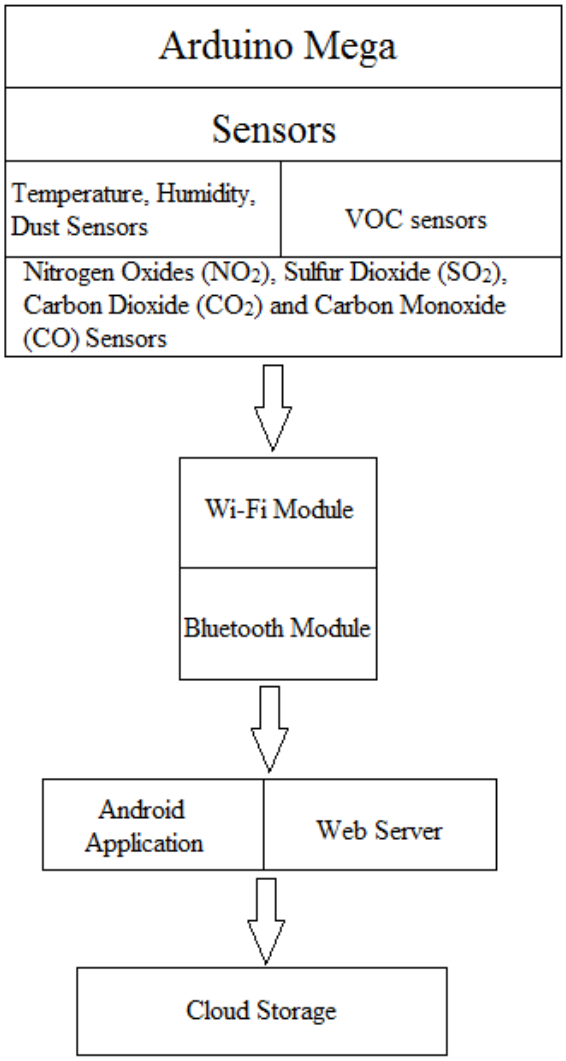
3. EXISTING SYSTEM

- The system consists of sensors, application software on smart phone, and a cloud storage, web server and Bluetooth module.
- The Arduino Pro Mini, an open-source development board with the 16MHz ATmega328 MCU.
- For communication purpose Bluetooth module is used along with Temperature and Relative Humidity Sensors, Micro CO2 Sensors.

4. PROPOSED SYSTEM

- The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button [9].
- Adding the new features to existing system the new proposed system consist of new sensors like, dust, alcohol and organic solvent vapors, Nitrogen Oxides, Ozone gas.
- It also use Wi-Fi module to connect user through internet.
- Historic data which can be useful that is stored on cloud can be retrieved whenever required.
- User will be alerted through notifications on his/her smart phones, smart devices, Webpages.

Architecture:



Hardware Requirements:

- Arduino Mega
- Sensors
- Wi-Fi module
- Bluetooth module
- Smartphone

Software Requirements:

- Arduino Software (IDE)
- Node JS
- Angular JS
- Mongo DB

5. CONCLUSION

To live a healthier life we have proposed a system that is arduino based where it consists of various sensors to sense the levels of harmful gases also with dust particles, temperature, and humidity. This data will be communicated to users through Bluetooth or Wi-Fi

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module situated on arduino board on their smart phones, smart devices and web pages. Alerts and notifications will be given to user to take preventive measures against indoor air conditions surrounding them. It is better to know our indoor environment where we are most of the time and monitor the air quality that we breathe.

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