AUTOMATIC AIR QUALITY CONTROL MONITORING SYSTEM IN BUILDING SERVICES

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Abstract

Air quality, temperature, and air humidity are pivotal factors that impact human well-being. These factors hold particular significance for children, especially infants, in comparison to adults. The quality of the air is gauged through the air pollution index, where a normal range falls between 0 and 100 IPUs. Air pollution indexes exceeding 100 are considered poor and are likely to impede respiratory health. Elevated temperature values surpassing room temperature can lead to increased energy consumption when utilizing fans or air conditioners to regulate indoor temperatures. Unnecessary energy wastage can occur if fans or air conditioners continue running even when the ambient temperature drops below room temperature. Excessive indoor air humidity promotes mildew growth, resulting in respiratory issues and potential harm to occupants within the household. An arrangement has been devised employing WEMOS D1 Wifi, alongside MQ135 and DHT11 sensors, with the aim of gauging and overseeing indoor air quality, temperature, and humidity through online connectivity. The obtained readings for air quality, temperature, and humidity levels will be viewable on the Blynk mobile application. This mechanism is geared towards notifying the occupants if the current air quality becomes unsuitable for breathing, subsequently activating the ventilation system automatically. The primary purpose of this system is to vigilantly monitor and enhance the well-being and living conditions of residents, particularly children, and infants. This is achieved by mitigating the risks of respiratory ailments, and fungal contamination, and ensuring more efficient electricity consumption.***Keywords: Air quality, air quality index, WEMOS D1, Blynk***.

INTRODUCTION

Humans require air for survival, and maintaining clean air is crucial for promoting healthy life. The air quality index, or air pollution index (IPU), serves as a tool to assess the quality of the air we breathe. The origins of air pollution are not solely attributed to suspended particles; they also stem from the excessive emission of toxic and harmful gases into the atmosphere. The suspended particles are composed of approximately 70% carbon particles, 20% soil dust, and 10% unidentified elements. On the other hand, harmful gases include carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), and sulfur dioxide (SO2) (Mahmud & Abu Hanifah, 2009; Mahmud & Ab Liah, 2010; Mahmud & Mohd Shafie, 2012; Shaharuddin Ahmad, 1990; Mazlan et al., 2015). The Department of Environment (DOE) reports that motor vehicles are accountable for nearly 82 percent of the total emissions of air pollutants, which amounts to over three million tons. Beyond exhaust emissions, air pollutants can also be released in the form of hydrocarbons due to the evaporation of carburetors and oil tanks. Furthermore, the emissions of pollutants are additionally influenced by factors such as engine technology, vehicle age, and the type of fuel employed. The remaining portion, accounting for nearly 9 percent of airborne pollutants, originates from power stations, while 5 percent is attributed to the industrial sector. However, by the year 1998, the proportion of air pollutants stemming

from motor vehicles had decreased to 74 percent. Poor air quality can lead to respiratory issues in humans, particularly in children and infants, causing difficulties in breathing.

The high air pollution index as a result of industrial advancement has increased the environmental temperature and caused discomfort to everyday human life. This will cause an increase in the use of electricity because the fan or air conditioner will be switched to lower the temperature to room temperature or the appropriate temperature. Domestic air pollution caused by biological pollutants such as microbes and fungi is influenced by environmental factors such as temperature and relative humidity (Rh). Most individuals spend almost 80-90% in buildings or indoors (Herberger et al., 2010)

PROJECT OVERVIEW

The focus on overseeing air quality has seen a significant surge, accompanied by an increase in the associated monitoring costs. Additionally, there exists a limited availability of user-friendly home air quality monitoring systems, designed to facilitate users in tracking pollutant levels. In response to this challenge, an indoor air quality monitoring system has been devised utilizing wireless Arduino and IoT technologies. This project primarily aims to design and create an automated system for monitoring and regulating air quality. This endeavour comprises both hardware and software components. The following are the project's key objectives:

1) Construct an indoor air quality monitoring system through the implementation of Arduino and IoT technologies.
2) Evaluate the gathered data encompassing temperature, air humidity, and air quality via the BLYNK platform.

PROJECT COVERAGE

The creation of the Automated Air Quality Monitoring System integrated with the Internet of Things (IoT) aims to curtail the incidence of Sick Building Syndrome. To accomplish this, the project utilizes ARDUINO, NODE MCU ESP8266, and the BLYNK system for control mechanisms. The assessment of air pollution can be conveniently accessed via the Blynk application. The accumulation of data serves to evaluate the outcomes yielded by the system's development.

Automatic Air Quality Monitoring System using Arduino Microcontroller

To facilitate air quality monitoring, a novel framework is proposed, leveraging a Wireless Sensor Network (WSN) for data collection and transmission. This framework targets the acquisition and transmission of various environmental parameters, including temperature, humidity, levels of CO and CO2, as well as the detection of potential gas leaks such as smoke, alcohol, and LPG. Utilizing Zigbee Pro (S-2) communication, these parameter values are relayed to a base station for continuous monitoring. Moreover, temperature and humidity values are also transmitted via Bluetooth, enabling individuals within the system's range to access this data via their smartphones and laptops, as these parameters hold relevance for a