IOT BASED AIR AND SOUND POLLUTION MONITORING SYSTEM

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ABSTRACT

One of the major problems nowadays is the growing amount of noise and air pollution. Due to the fact that a rising number of diseases are being caused by pollution, it is crucial to regulate pollution in order to ensure a better future and healthy lives for everyone. In this paper, we provide an IoT-based air quality and noise pollution monitoring system that can track real-time data from specific locations. The air sensor in the system is continuously sending data to the microcontroller about any potentially dangerous gases or compounds it detects. Additionally, the system reports the sound level to the Blynk server using IoT. Our project's primary objective is to track the vehicle's air pressure and noise levels utilizing a variety of sensors and the Blynk server. We will keep people updated about pollution levels by updating the information on the blynk server. Air filtration techniques were also incorporated into this project to enhance air quality.

Keywords: *Blynk server, Internet of things (IOT), esp32 camera.*

1. INTRODUCTION

Modern society faces serious challenges due to air and sound pollution. Maintaining acceptable levels of air pollution is critical to ensuring a healthy and prosperous future for all people. Here we present an IoT-based air quality and noise pollution monitoring system that can track real-time data on these pollutants in specific locations. The system continually updates the microcontroller with data from air sensors that detect potentially dangerous chemicals and compounds. Additional functionality includes continuous sound level measurement and reporting to an internet server over IoT. A microcontroller receives data from the sensors, analyzes it, and then sends it out via the internet. Because of this, officials can track pollution levels in various regions and respond accordingly. Additionally, officials may monitor noise pollution around no-honking zones, schools, and hospitals; if the system identifies problems with air quality or noise, it will notify the appropriate authorities. The Internet of Things (IoT) has a lot of fantastical potential future consumer uses, but here are a few that sound more plausible: Getting alerts on your mobile or wearable device whenever Internet of Things networks identify a potential physical threat in the area. Self-parking vehicles. Online grocery shopping and other household items ordered automatically. Automated monitoring of physical activity and other daily activities, with the ability to set goals and receive frequent updates on progress.Things Connected to the Internet and Network Devices It is possible to make almost any common household appliance function with an Internet of Things system. To make these gadgets operate in the IoT, you may put Wi-Fi network adapters, motion detectors, cameras, microphones, and other instruments into them. Light bulbs and other early instances of Internet of Things (IoT) devices, such as wireless scales and blood pressure monitors, are already using this idea in their home automation systems. Technology is advancing at a dizzying rate in this age of modernity. We can always tell when a new piece of technology is about to hit the market and make our lives easier. Evaluating pollution levels at certain intervals used to be a time-consuming and inefficient process. The fast growth of both pollution and technological capability necessitated the development of novel approaches to both the problem and its solution. The internet of things is the only relatively recent development to follow this trajectory. The growth of the internet and, by extension, human contact with machines, gave birth to the Internet of Things (IoT). It paves the way for data interchange across many electronic gadgets, such as refrigerators, automated washers, cars, and digital watches.

1.1 Objective

Using the internet of things (IoT), a system may be set up to monitor the noise levels and air quality in a certain region. Data is collected and analyzed by use of sensors. By doing so, we can pinpoint problematic areas, implement solutions, and make the community a safer and healthier place for everyone.

2. Block diagram

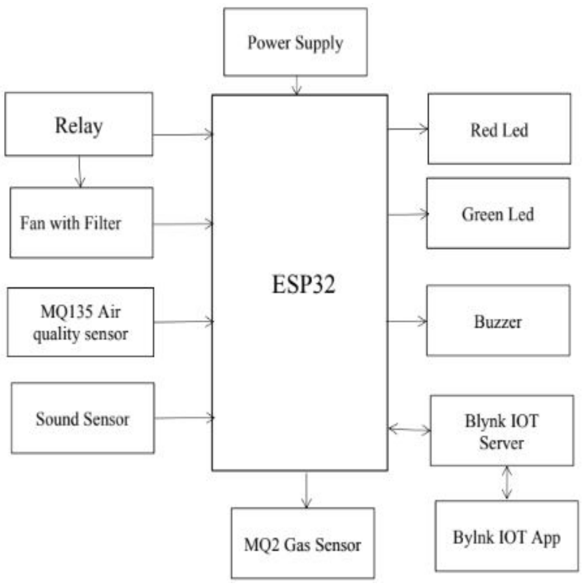

Fig.2.1. Block diagram

2.1 WI-FI Module(ESP8266):

An inexpensive microcontroller unit (MCU) with integrated Wi-Fi is the ESP8266. It comes with Wi-Fi networking capabilities and may be coupled with other host micro controllers, such as an Arduino, to provide a basic platform for IoT development. The ESP8266 has several useful features, such as an Analog to Digital converter, 16 general-purpose input/output (GPIO) pins (4 of which may be used for pulse width modulation), an 80 MHz 32-bit CPU, SPI and I2C interfaces, and another application as a standalone microcontroller unit (MCU). The MCU can operate within a voltage range of 2.5-3.6V and a current range of 80 mA on average.

Fig.2.2.ESP32 Module

2.2 MQ2 Gas Sensor

Modular Gas Sensor MQ2 The versatile and inexpensive MQ2 gas sensor can identify a variety of gases, including hydrogen, propane, methane, and other flammable steam, among others. The sensor is very sensitive to smoke and combustible gases. The smoke detector is powered by 5 volts. A smoke detector's output voltage serves as an indicator of the presence of smoke. Smoldering increases production. To fine-tune the sensitivity, a potentiometer is included. The Sn02 sensor is utilized because, in clean air, it has a low conductivity. The sensor, however, gives an analog resistive output proportional to the smoke concentration whenever smoke is present. A heater is part of the circuit. The heater receives electricity from the power source via VCC and GND. There is a variable resistor in the circuit. The amount of smoke in the air that the sensor picks up determines the resistance across the pin. Increasing the content will decrease the resistance. Additionally, the sensor and load resistor are connected to an elevated voltage.

Fig.2.3.MQ2 Gas Sensor

2.3 MQ135 Air Quality Sensor

Ammonia, nitrogen, oxygen, alcohols, aromatic chemicals, sulfur, and smoke are all detectable by the MQ-135 gas sensor. Chip MQ-3 gas sensor PT1301 is the name of the boost converter. This gas sensor can withstand voltages between 2.5V and 5.0V. As a gas detecting material, the MQ-3 gas sensor has a reduced conductivity, which helps to purify the air. There are harmful gases in the air, and the conductivity of gas detectors rises in relation to the concentration of these chemicals. You may use the MQ-135 gas sensor to detect dangerous gases including steam, benzene, smoke, and more. It may be able to identify certain dangerous gasses. Buying the MQ-135 gas sensor won't break the bank. Sensor for Gases MQ-135 The MQ135 gas sensor uses SnO_2, a substance with a decreased conductivity in clean air, as its sensitive material. The conductivity of the sensors increases in tandem with the concentration of the target flammable gas when it is present.

Fig.2.4.MQ135 Air Quality Sensor.

2.4 Sound Sensor

To detect sounds, one kind of module is the sound sensor. The main function of this module is to measure the loudness of sounds. Switch, security, and monitoring are the primary uses for this module. For convenience, this sensor's accuracy may be adjusted. The microphone on this sensor feeds signal into the amplifier, peak detector, and buffer. A microcontroller receives an operational voltage signal from this sensor once it detects sound. Following that, it carries out the necessary processing. The human ear is most sensitive between 3 and 6 kHz, and this sensor can measure noise levels in decibels (DB) at those frequencies. An android app called decibel meter may be installed on cellphones to measure the volume of sound.

Fig.2.5.Sound Sensor

2.5 Relay

The electrical contacts of a switch can be turned on or off by use of a relay, which is an electrical device. Rather than being a simple empty relay, the single-channel relay module has features that facilitate connection and switching as well as indicators that show if the module is on and the relay is operational.

Fig.2.6. Relay

2.6 DC FAN

This is a cooling fan for exhaust that is small in size. Imagine holding this little fan in your hand. It operates on 12V DC. A standard 12V battery will power it up with no problem at all. The speed range for this little fan is 6800 to 13,000 revolutions per minute. The fan's body is constructed from a mix of plastic and resin. The fan is made stronger and more insulated by the combination. It is sturdy enough to withstand several drops from a height while being rather lightweight thanks to its construction. Here you can find a single fan that is both strong and insulating, making it an ideal choice.

Fig.2.7. DC Fan.

3. Schematic Diagram

The system has the capability to track and manage the level of air pollution in the region.A sound intensity sensor is also a part of the system, and it provides information on the local sound environment.When something out of the ordinary happens, you may operate the air purifier via the Blynk IOT app, which creates the IOT server. Once dust and other airborne pollutants are captured by the filter, clean air is expelled into the room by means of a fan. When it comes to air purifiers, there are essentially two kinds of filters: A couple of them promise to remove volatile organic compounds (VOCs), while the other two remove gasses and particles, respectively.

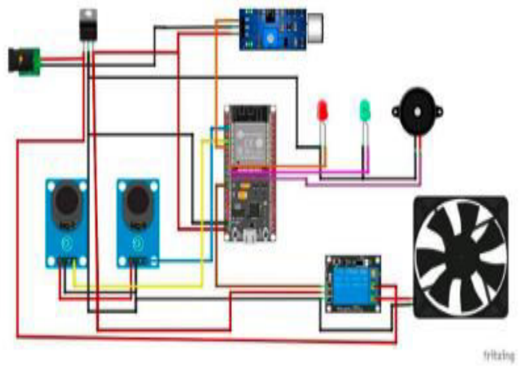

Fig.3.1. Schematic Diagram

4. Flowchart

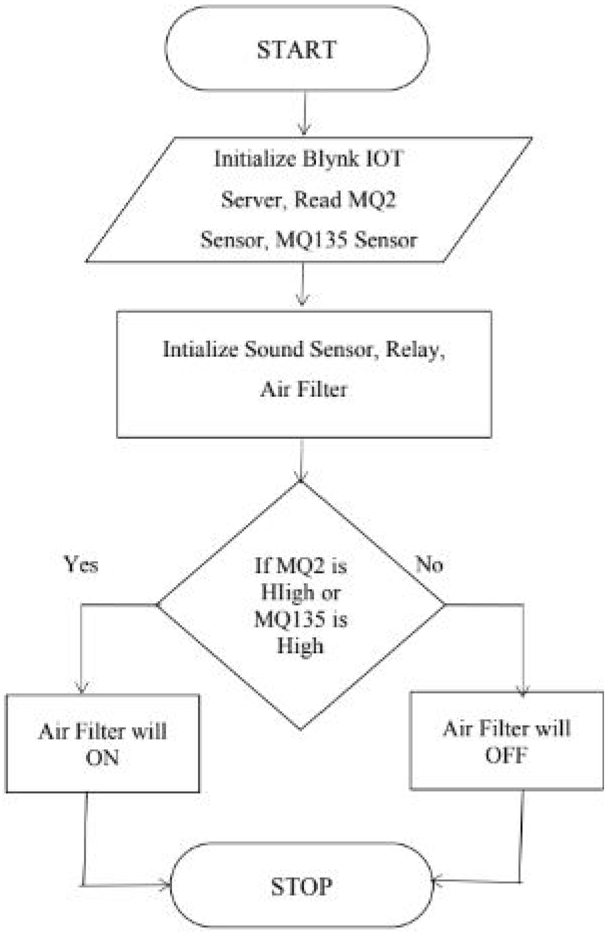

Fig.4.1. Flow Chart

5. RESULTS AND DISCUSSION

We have completed the design and testing of the "AIR AND SOUND MONITORING SYSTEM" project. Engineers have created it by incorporating characteristics of all the hardware parts. Each component has been thoughtfully considered and positioned to ensure optimal performance of the device. Secondly, the project was a success because it made use of cutting-edge integrated circuits and benefited from ever-expanding technological resources. So, the project came to a close.

1.When the pollution is normal i.e, GREEN LED glows and Air Filter will OFF.

Fig.5.1 Pollution is Normal

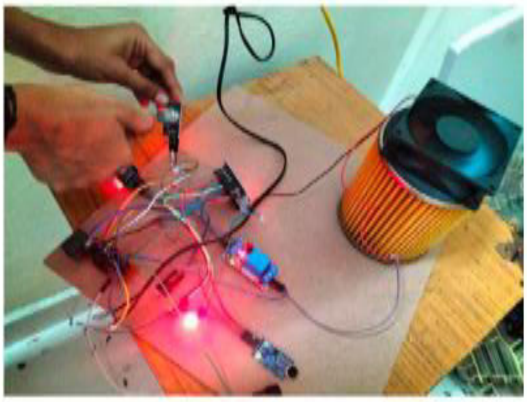

Fig.5.2 Pollution is abnormal

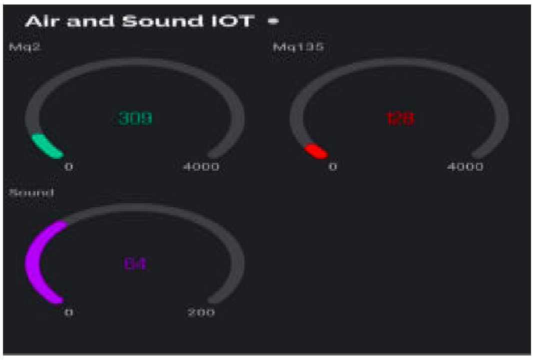

Fig.5.3 Levels of Air and Sound Pollution

5.1.1 Numerical Representation of Input Corresponding Outputs

ELEMENT	INPUT	OUTPUT
MQ2 Gas Sensor	MQ2>1200	High Intensity Smoke is Detected.
MQ135 Air Quality Sensor	MQ135>600	Low Air Quality is Detected.
Sound Sensor	dB>70	High Intensity Sound is Detected.

6. Conclusion and Future Scope

Conclusion:

The air pollutants, including dust, smoke, carbon monoxide, and carbon dioxide, were precisely monitored by the created air quality and sound pollution monitoring system. Using the sensor, we have been able to track the levels of noise and pollution in real time. Monitoring pollution, health, livelihood, and other measurement-related domains is no longer an issue with this approach.

FUTURE SCOPE:

Expanding the system to include other criteria that contribute to pollution, particularly from industry, is necessary because it is now only monitoring five parameters: Particulate Matter, Carbon Monoxide, Nitrogen Dioxide, Noise Level, and Ozone. Although there exist sensors that can detect some pollutants, they are often prohibitively expensive; hence, developing such sensors for a variety of criteria may be an arduous and time-consuming endeavor. We can utilize solar power as an external energy source in the future to increase the system's dependability, since the developed system consumes too much power.

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