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INTELLIGENT SMART AEROSYNC AIR PURIFIER

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ABSTRACT

In order to create a healthier home atmosphere, the "Smart Air Purifier" project seeks to design and build a novel air purification system that blends cutting-edge technology with intuitive features. Sensors are integrated into this smart device to identify air contaminants like dust, allergies and volatile organic compounds (vocs). To get rid of dangerous particles, gems and viruses. It uses multistage filtration process that includes activated carbon and HEPA filters. Industries like manufacturing, healthcare, and hospitality are realizing how important clean air is for both employee health and smooth operations. IoT technology helps connect devices, enabling real-time monitoring of air quality, data analysis, and automatic responses to changes in the air. Advanced sensors in air purification systems can constantly check air quality by measuring things like dust particles, harmful chemicals, and gases.Advanced sensors in air purifiers measure pollutants like particulate matter (PM), volatile organic compounds (VOCs), and harmful gases, ensuring optimal air quality and healthier work environments.

Keywords: Multistage Filtration, Real Time Monitoring, Graphical Display, Mobile Alert System.

I. INTRODUCTION

Industries, particularly those involving manufacturing, healthcare, and hospitality, are recognizing the importance of maintaining clean air for both employee's well-being and operational efficiency technology enables the connection and communication between devices, allowing for real time monitoring, data analysis, and automated responses to changes in air quality. Advance sensor networks embedded in air purification system can continuously assess air quality parameter such as particulate matter (PM), volatile organic compounds (VOCs), and other harmful gases. Automatically detects and removes harmful particles, dust, allergens and germs. Monitor air quality in real-time. Uses a multi-stage filtration system, including: HEPA filter, Activated carbon filter. As global awareness of air quality and its impact on health continues to grow, the need for effective air purification solutions has never been more critical. Industries, particularly those involving manufacturing, healthcare, and hospitality, are increasingly recognizing the importance of maintaining clean air for both employee well-being and operational efficiency. In this context, the integration of Internet of Things (IOT) technology into air purification systems represents a significant advancement.

II. METHODOLOGY

We used a methodical approach to install the smart air purifier, beginning with the identification of important contaminants and the choice suitable sensors to track the quality of the air, for efficient purification, we combined activated carbon, and HEPA in a multistage filtration system based on real time air quality data gathered by sensor , the gadget is built with automatic adjustment capabilities.

We created a interface that lets users track air quality and get alerts for remote monitoring and control.

Filtration 1. HEPA filter

HEPA filters work by forcing air through a fine mesh that captures these tiny particles, ensuring that the air that comes out of the purifier is cleaner and healthier to breathe. To qualify as a true HEPA filter, it must trap at least 99.97% of particles that are 0.3 microns in size or larger. This makes them highly effective for improving indoor air quality, especially for people with allergies or respiratory conditions.

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PRE filter

In an air purifier, the **pre-filter** serves as an initial line of defense by capturing larger particles before they reach the more advanced filters, such as the HEPA filter. The main functions of a pre-filter are:

1. Capturing Large Particles
2. Extending the Life of Other Filters
3. Improving Overall Air Quality

Carbon filter

In air purifiers, the carbon filter is primarily used to remove gases, odors, and volatile organic compounds (VOCs) from the air.

III. MODELING AND ANALYSIS

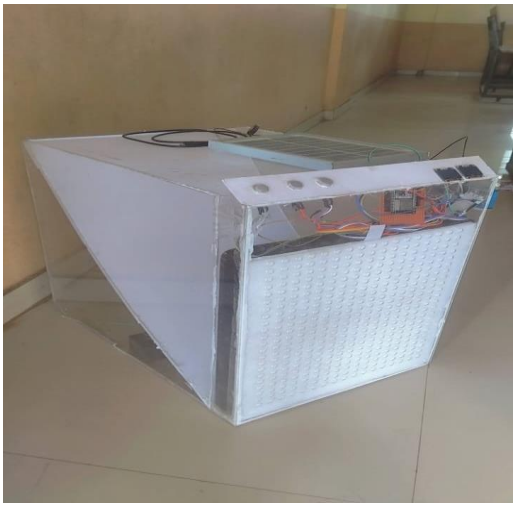

Figure 1: model of air purifier

IV. RESULTS AND DISCUSSION

For a healthy environment, the ideal concentrations of carbon monoxide(CO), nitrogen dioxide(NO2), and benzene in purified air should be as low as possible, ideally within the following recommended limits

SN.	Purifiers	Gases	Displacement
1	PM1	Carbon Monoxide	4,000ppb
2	PM2	Nitrogen	25ppb
3	PM10	Benzene	0ppb(undetectable)

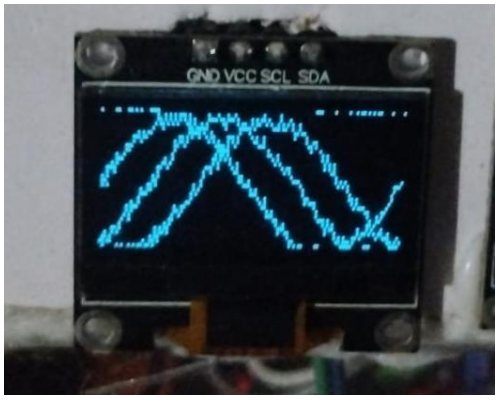

Figure 2: Polluted Air

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V. CONCLUSION

Enhanced Air Quality and Health: The smart air purifier effectively filters pollutants, allergens, and harmful gases, leading to improved indoor air quality and a healthier environment. Operational Efficiency and User Convenience: With features like real-time monitoring, automated adjustments, and remote control, the system ensures optimal performance and user-friendly operation.

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