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Automated Air Purifier Robot

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Abstract: Growing air pollution has become a major worry for all countries since the advent of industrialization and modernity. Each person's health is affected differently by air pollution, which can lead to serious consequences. The largest environmental health concern in the world is air pollution, particularly indoor air pollution, which is connected to over 4 million deaths a year from conditions like lung cancer, ischemic heart disease, stroke, and chronic obstructive pulmonary disease.. The air inside our homes and workplaces can become contaminated with dangerous pollutants as cities and industries grow. This is where air purifiers become crucial, and new developments have introduced autonomous air purifier robots as a new player in the field. These robots are not your normal stationary air purifiers; instead, they move around and clean the air using cutting-edge technologies like robotics, artificial intelligence, and sensors. These robot air purifiers are more dynamic than typical air purifiers because they can adjust to changing indoor settings. The objective of this review paper is to examine autonomous air purifier robots, including their history, essential technological elements, uses, and possible effects on indoor air quality. We want to comprehend the benefits, constraints, and distinct issues these robotic solutions tackle when compared to traditional air purifiers by looking at the state of the art. We will also talk about user experiences, upcoming trends, and the moral issues surrounding the use of these self-governing systems.

I. INTRODUCTION

During the summer, allergies, dust, and pollution are the most prevalent issues. The need for air purifiers is rising in tandem with the quantity of air contaminants. These air purifiers are suitable for usage in homes, workplaces, and commercial spaces. If their effectiveness is great, they can even be used outside. An air purifier is a device that cleans the air of impurities such as dust, fabric fibers, and other particles. There are claims that these gadgets help those who have asthma and allergies.Commercially rated air purifiers are made in two sizes: smaller standalone models or bigger models that may be mounted on HVAC (heating, ventilation, and air conditioning) units, which are common in the commercial, industrial, and medical sectors. Before processing, air purifiers can be used in industry to eliminate contaminants like CO2. A typical air purifier uses a variety of filter types and filter levels to eliminate pollutants from the air around them.

A. What is an Air Purifier?

Air purifier is a device which removes contaminants from the air in a room. These gadgets are frequently advertised as helping those with allergies and asthma as well as lowering or getting rid of secondhand tobacco smoke. Commercially rated air purifiers are produced in two sizes: smaller standalone devices or bigger units that can be mounted to HVAC units or air handler units (AHUs) common in the commercial, industrial, and medical sectors. Before processing, air purifiers can be used in industry to eliminate contaminants like CO2. Usually, for this, pressure swing absorbers or other adsorption methods are employed. Allergens such as dust, pollen, mold spores, pet dander, and mite excrement can cause allergies in susceptible individuals. Being exposed to different elements, including vocs, raises the risk of developing sick building syndrome symptoms. Air purifiers are also getting better at catching more germs, viruses, and particles that damage DNA due to technological advancements in air purification. Air purifiers can be helpful in lowering the concentration of these airborne pollutants.

II. LITERATURE SURVEY

Research is done prior to taking up the project and understanding the various methods that were used previously. This study helped us to identify the benefits and drawbacks of the existing systems. According to a survey , it is claimed that use of IoT (Internet Of Things) and Simultaneously Monitoring & Purification is required which can be operated from anywhere in the world. So, to overcome this problem, we are implementing an IoT-based air purifier system to minimize and control the indoor air pollution. In the Research paper of Intelligent Air Purifier and Indoor Environment Improvement System there is use of IoT (Internet Of Things) and Simultaneously Monitoring & Purification is not efficiently integrated .In the Research paper Air purifier using super-absorbent polymer for removing air contaminants there is use of Carbon sensor.

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The most of the system are not IoT(Internet Of Things) based which don't save the data to the servers and also simultaneously monitoring & purification is not used in existing system. Carbon Sensor is not used with HEPA and UV light.We discovered several approaches to accomplish this. A drive's automation might be difficult because there are a lot of factors to consider. Obstacles both static and dynamic must be avoided. It has made use of radar. Our goal for the automation was to have good movement precision at a low cost To achieve our autonomy aim, we use a GPS guided system.

Reference	IoT (Internet Of Things)	Rover	Simultaneously Monitoring & Purification	Carbon Sensor
[1]	✓	×	✓	×
[2]	✓	✓	×	×
[3]	×	×	✓	×
Proposed Model	✓	✓	✓	✓

Table: Literature Survey

III. WORKING

The air purifier rover is equipped with different layers of filters where varying size dust particles, bacteria, viruses and odour will be trapped. Air purifier is powered by the electricity from the available socket or can be run by a battery with a full charge. A typical purifier draws incoming air past a series of different cleaning stages, each of which tackles a different kind of airborne pollutant:

Fig 1- Filtration Process

Air quality sensors detect the quality of the air and provide the degree of pollution through a monitoring system. The air suction is where air enters through a suction fan.Large hair and pet hair particles are captured by a rather coarse pre filter. This filter is composed of polypropylene netting that has been coated in catechin, a naturally occurring bitter compound found in green tea that serves as a deodorant and antimicrobial.

HEPA filters use a convoluted web of fibers to capture airborne pollutants. Based on the dimensions of the particle, one of four processes—inertial impact, diffusion, interference, or sieving—can cause this. Larger pollutants are screened out and trapped by inertial impact. Either the particles are trapped while trying to pass through the threads, or they collide with the fibers and become imprisoned. The fibers intercept the medium-sized particles as they pass through the filter and snatch them up. The main mechanism via which activated carbon extracts impurities from liquid or vapor streams is physical adsorption. Contaminants are able to stick to the activated carbon media due to carbon's high surface area per unit weight. Several attractive forces act on carbon's vast interior surface area to draw in other molecules. Because of these forces' similar manifestations to gravitational force, impurities in water are adsorbed, or attached, to the surface of carbon from a solution due to variations in the concentration of adsorbate in the solution and in the carbon pores.

Air flow through these multiple layers provides a clean air with a efficiency of < 99.99% the air purified air is channeled out buy a help of a fan which can push the air out based on the capacity of the fan used.

All these filter increases the purification level of air. In last step purified air comes out. All of the data related to purification of air is uploaded on the servers for monitoring.



Fig 1- Filtration Process

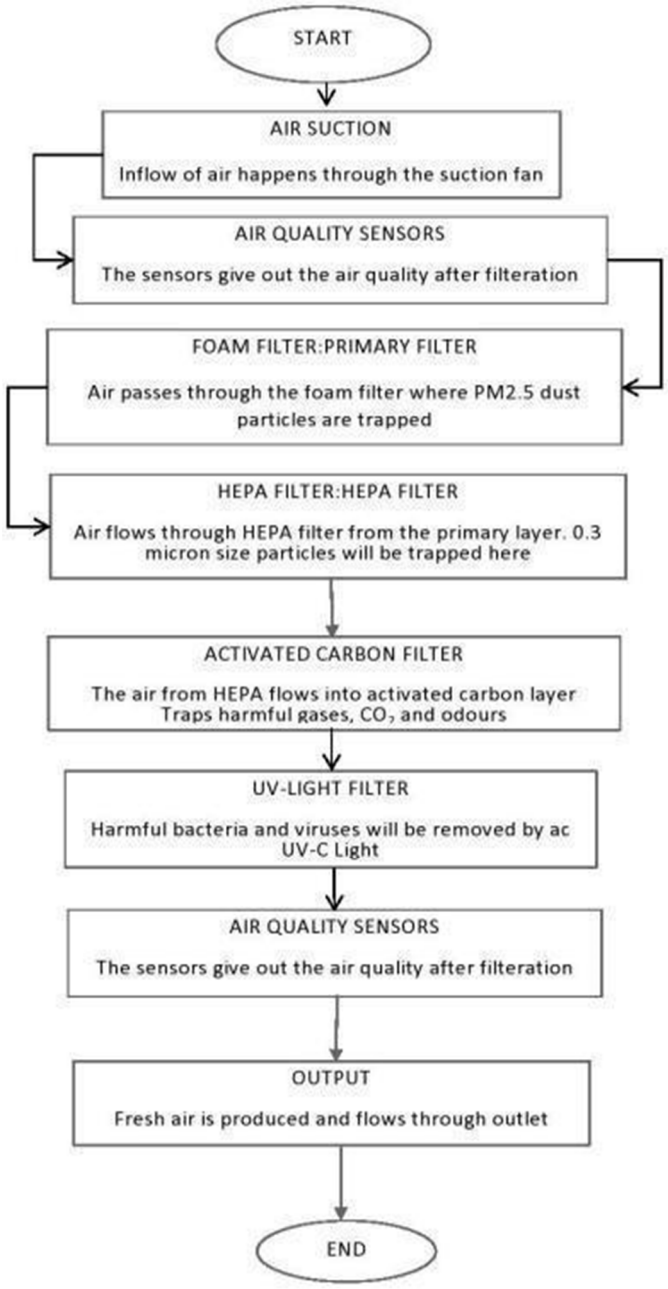


Fig 2- Flow chart

IV. CONCLUSION

There are numerous varieties of air purifiers with various technologies on the market. Some might have UV, ionizing, charcoal, HEPA, and many more technologies. Additionally, some purifiers have multiple technologies inside them for improved performance and functionality. So, pick the greatest option that fits your needs and budget. The primary purpose of a HEPA filter is to purge the air of harmful viruses and produce clean, pure air. A HEPA filter is therefore an essential buy for anyone with a dust or pollen allergy. The filters must meet strict requirements in order to be designated as HEPA filters. 99.97% of particles as small as 0.03 microns should be removed using a HEPA filter.

Therefore, only purchase high-quality products from reputable vendors; stay away from purchasing "HEPA Type" or "HEPA Like" filters, as they won't give you the greatest results when compared to genuine HEPA filters. Finally, you may order your HEPA filter air purifier from a variety of suppliers. Why wait to get such opulent home furnishings?

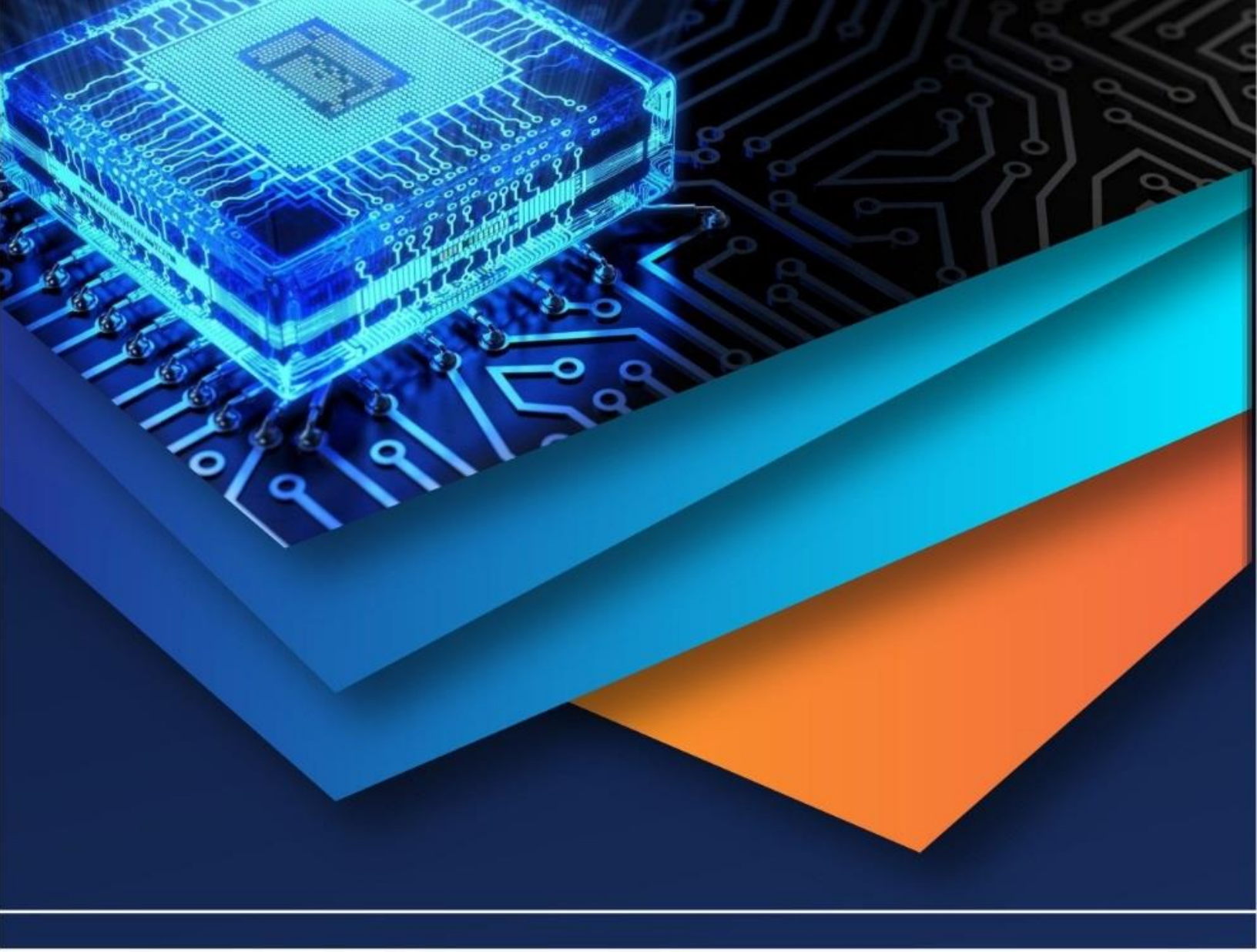
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PM2.5 µg/m3	Air Quality Index
12.1 to 35.4	Moderate 51 to 100
35.5 to 55.4	Unhealthy for Sensitive Groups 101 to 150
55.5 to 150.4	Unhealthy 151 to 200
150.5 to 250.4	Very Unhealthy 201 to 300

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