

DEVELOPMENT OF ECOFRIENDLY AIR PURIFIER

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Abstract

In this present work tend to think of air pollution as something that happens outside, but that's not always the case. Even inside your home, there are things like dust mites and dirt trodden in from outdoors to worry about. Outdoor and Inside air pollution from sources like this can irritate your lungs and contribute to allergies and asthma. The trouble is, if we use an ordinary vacuum cleaner, we might simply be "rearranging the dirt": our cleaner will trap some of the dust inside the bag or cyclone filter but let the rest pass straight back into the room. If you suffer from asthma or another breathing difficulty, you may find a HEPA (sometimes defined as "high- efficiency particulate air," sometimes as "highenergy particulate arresting") air purifier (or a vacuum with a HEPA filter) well worth the investment.

Keywords:HEPA filter,UV light, ionizer, aluminium shell

I. Introduction

The most common problem during the summer season is pollution, dust, and allergies. With increase in the number of pollutants in the air, there is an increase in the demand for air purifiers. These air purifiers can be used in offices, homes, commercial places efficiency is high, and then they can also be used outdoors. Air purifier is a device used to remove contaminants like dust particles, cloth present in the air. These devices are claimed to be beneficial to people having allergies, an asthma. The commercially graded air purifiers are manufactured as either small stand units or larger units that can be affixed to an air handler unit (AHU) or to a heating ventilation and airconditioning (HVAC) unit found in the medical, industry commercial industries. Air purifiers may also be used in industry to remove impurities such as CO₂ from air before processing. A standard air purifier consists of various types of filters, and filter levels to remove the contaminants from the surrounding air.

I. LiteratureReview

Mengjie Wu et al. (2020) have studied the clean, healthy and fresh indoor air in the process of controlling atmospheric pollution is one of the major challenges facing the present and the future. At

present, people mostly use air purification technology to optimize indoor air quality. Air purification technology can effectively remove indoor pollutants and improve indoor air quality. [01]

Kannan Maharajan et al. (2021) have studied the industrialization and urbanization, air pollution has become a serious global concern as a hazard Aerosols to human health. Epidemiological studies found that exposure to atmospheric particulate matter (PM) causes Health effects severe health problems in human and significant damage to the physiological systems [02]

Sai Santosh Vamshi et al. (2021) have studied the Urbanization and industrialization lead to the increased usage of fossil fuels for running various types of automobiles and industries in developing countries. The rapid growth of automobiles usage in major cities causes air pollution and its direct impact on public health. [03]

Gowri raja Pandian et al. (2019) have studied the Air contributes a prime role in recycling earth's most essential substances like carbon, since carbon sources encompass fossil fuel combustion and decayed matter of dead animals. [04]

Himanshi Rohra et al. (2021) have studied the High-Efficiency Particulate Air (HEPA) filters that differed in other specifications were employed in general indoor air and the presence of an external source (candles and incense). [05]

Rahul Yashwanth Powar et al. (2022) have studied the research paper is about designing and fabricating an air purifier system which is powered by solar energy and testing the effectiveness of the system to curb the air pollution. [06]

Aditya Roy et al. (2022) have studied the result, a lot of research has been focused into the various methods of purifying air. The most harmful of the pollutants are PM 2.5 particulates and NO_x emissions. The aim has been to bring down the costs without compromising on efficiency as efficient air purification is an expensive deal. [07]

Dr. Jose Alex Mathew et al. (2022) have studied the air filtration techniques have been adopted to optimize indoor and outdoor air quality. Air filtration technique remove air pollutants and effectively alleviate the deterioration of indoor and outdoor air quality. A comprehensive review on the

synergistic effect of different air purification technologies, air filtration theory, materials and standards. [08]

Pranavi Vashishtha et al. (2020) have studied the air pollution these days is a serious environmental concern and it is not just a mere fact but a harsh reality which is creating problems for the mankind such as some serious health issues. In some parts of the world the air quality index has reached to an irrefutable level which demands for a solution now.[09]

Sangita Vyas et al. (2016) have studied the number of particles between 0.5 μ m and 2.5 μ m indoors while using affordable air purifiers in the highly polluted city of Delhi. Though substantial reductions in indoor number concentrations are observed during air purifier use, indoor air quality while using an air purifier is frequently worse than in cities with moderate pollution, and often worse than levels observed even in polluted cities'[10]

II. Objectives

- Procurement of materials for air purifier and fabrication of indoor air purifier.
- Assembly of filter, such as pre filter, Anti-Bacterial filter, HEPA, cellular activated carbon filter, photo catalyst filter, VU light and Ionizer.
- Air purifier is analyzed to check its impact on indoor air-quality and indoor Environment

III. METHODOLOGY

Air Purifier operates with 6 advanced stages of filtration: a cold catalyst filter, a cellular-activated carbon filter, an anti-microbial filter, a HEPA filter, an ionizer, and a UV sterilizer.

3.1 FILTERS USED

1.Pre Filter and Cold Catalyst Filter

Pre Filter and Cold Catalyst Filter is the first stage of filtration. Heavier particles like pet dander and human hair are removed by this filter. The cold catalyst filter is effective at removing formaldehyde, benzene ammonia, hydrogen sulphide, and harmful gases.

2 Activated Carbon Filter

Activated Carbon Filter uses activated carbon to remove contaminants from air through adsorption. In addition to pollutants this filter is also effective in removing odours from the air.

3. anti-microbial Filter

Anti-microbial Filter is just 5 microns thick helps to trap harmful, disease-causing microbes and keep them out of the air that you breathe indoors. Antimicrobial agent effectively kills bacteria in air.

4. HEPA filter

HEPA filter's precision is 0.03 micron, which means it eliminates particles which are larger than 0.03 micron with a filtration rate of 99.97%. The bacteria, dust, allergens, viruses, fungi and other small and tiny particles do not go through HEPA filter.

3.2 COMPONENT USED

1. Ultraviolet light

The 245nm ultraviolet light is able to sterilize a variety of bacteria. The germicidal lamp is used to purify the air and it is able to eliminate odour caused by smoke and mold. Ultraviolet light works independently from the other filters to neutralize microorganisms. This is especially efficient at converting pathogens, mold spores, etc., to harmless by-products.

2. Negative Ionizer

Using electricity, air ionizers create negative ions which are then discharged into the air. These ions continuously clean your room by bonding with dust particles, bacteria, cigarette smoke, etc. This ionizer needs to be cleaned when you hear a creak sound from the filter. Using the brush tool provided, clean the dust around the ionizer.

3.Fan

An electric fan is used to pull air through the air purifier. The fan is usually purchased from a small-parts supplier. The fan consists of a small electric motor with metal fan blades attached to the motor's power take-off. The fan blades are usually spot slipped onto the power take-off and bolted in place. The fan is usually attached to the case with steel screws.

3.3MATERIAL USED

1. Sun Board (Foam Board)

Sun board or Foam board is a very strong, light, and easily cut sheet material used for the mounting of vinyl prints, as backing in framing, and for painting. It usually has three layer- - an inner layer of polystyrene foam and a white clay coated paper on the outside.

2. Adhesive Tapes

Adhesive tapes is a combination of a material and an adhesive film and used to bond or join objects together instead of using fasteners, screws, or welding. Applying adhesive tapes in lieu of mechanical fasteners enables you to use lower temperature applications, which can simplify the manufacturing processes.

3. Super Glue

Super glue, or cyanoacrylate, is the general name for a family of fast-acting adhesives with industrial, medical and household uses. It usually comes in a small tube, and is often sold as "Super Glue".





	
Figure 1: Pre filter	Figure 2: Activated carbon filter
	
Figure 3: Anti microbial filter	Figure 4: HEPA filter

		
Figure 1: UV Light	Figure 2: Ionizer	Figure 3: Fan
		
Figure 1: Sun Board (Foam board)	Figure 2: Tape	Figure 3: Super Glue

IV. RESULTS AND DISCUSSION

- The main focus of this project is to get better quality of air in different methods by using filters.
- This project includes the fact of purification of air where air can be treated well enough to breath from polluted air.
- This method of purifying air is natural where we are using renewable energy so it is outdoor air filtration system. Can be kept outside .

VI. Conclusions

- There are many different kinds of air purifier available in the market with different technologies. Some may have HEPA, carbon, ionizing, UV technology and many more. Some purifiers also contain more than one technology for advanced functioning and better results. Thus, choose the best one matching your requirement and budget.
- The main function of HEPA Filter is to remove contaminated viruses from the air and provide clean and pure air. Thus, HEPA Filter is a crucial purchase element for the one suffering from dust or pollen allergy. Strict standards have been set for the filters to be classified as HEPA. A HEPA Filter should be able to remove 99.97% particles being small as 0.03 microns.
- So buy only a quality product from reliable sources and avoid buying “HEPA-Type” or “HEPA-Like” filters, as these filters will not provide you the best result as compared to the true HEPA Filters.
- At last, there are many sources from which you can order your HEPA Filter Air Purifier. Why wait for more to avail such luxury home stuff. Click [here](#) if you like to buy the best



HEPA Air Purifier.

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