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"Design and Development of Silent Air Purifier and Humidifier Using Water Filter"

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Abstract: ***In 2021, air pollution has gone beyond all limits. According to the WHO, 7 million people die annually as a result of air pollution. A whopping 91 percent of the world's population is now exposed to air pollution due to its wide distribution. This also implies that the air within your home is contaminated. In order to address this problem, we have developed a small air purifier that employs water as an air filter rather than pricey filters. Additionally, it functions as an air humidifier and can be used as an oil diffuser, both of which promote relaxation and the elimination of some airborne bacteria and viruses.***

Homes in larger cities are often affected by poor interior air quality, which is a result of an expanding industrialization that contaminates the air we breathe with pollutants including industrial dust, smoke, and other particles from traffic. Utilizing an air purifier to remove these particles from the air within the user's home is the best option from the user's point of view. People who have allergies can also use an air purifier to reduce their irritation. The design and development of the next-generation indoor air purifier is the subject of this thesis. The project was carried out using a human-cantered design process, and a patient was the end outcome.

The system uses two high performance, low noise centrifugal fans to draw air through a safety mesh. At the bottom of the purifier, there is a water tank through which the air is pushed and subsequently passed. Water catches dust, fungi, germs, and other contaminants, which causes the air it passes through to be automatically cleansed. High humidity cold air rises through the water as a result. Additionally, by adding essential oils to the system, it is possible to humidify the space/room with these oils, which have been shown to destroy specific germs and fungi in the air and promote human relaxation. In addition, studies show that particular essential oils have a number of health advantages when inhaled.

Keywords: Air purifier, Air Humidifier, Water filter, Air pollution, Air quality

I. INTRODUCTION

The world's major cities and many other nations are currently experiencing severe air pollution. The air in the vicinity of cities is contaminated by factories, cars, and the usage of non-renewable energy. This is a significant issue in China and India because more than 1 billion people live in their dirty cities. Air purifiers are the method that people use to purify the indoor air in polluted locations. Most people who are afflicted by bad air quality maintain this gadget in their homes and workplaces.

The primary purpose of an air purifier is to circulate air around the house using suction from an internal fan. After passing through a filtering medium that captures the polluting particles, clean air is released. However, the majority of air purifiers available today use so-called HEPA filters, which need to be changed out frequently and use a lot of energy. Since pricing is one of the most crucial considerations for clients when purchasing an air purifier, this solution is fairly expensive and not appropriate for everyone. The aesthetic design of an air purifier is crucial because it is a component of the aesthetic in a home.

Allergies, pollution, and dust are the three main issues that people encounter during the summer. There is a rise in demand for air purifiers along with the amount of air contaminants. These air purifiers can be used indoors or outdoors depending on how effective they are. They can be utilized in homes, offices, and commercial settings. An air purifier is a device that cleans the air by removing impurities including dust, fibers from clothing, and other toxins. People with allergies and asthma are said to benefit from these devices.

A device called an air purifier or air cleaner eliminates impurities from the air in a space to enhance indoor air quality. These products are frequently marketed as helping allergy and asthmatic sufferers, as well as minimizing or eliminating second hand smoke. Commercially rated air purifiers can be found in the medical, industrial, and commercial sectors. They can be produced as small stand-alone units or bigger units that can be attached to an air handler unit (AHU) or an HVAC unit. In the industrial setting, air purifiers can be utilized to clean the air before processing. For this, pressure swing absorbs or other adsorption techniques are typically utilized.

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II. METHODOLOGY

Following methodology is to be carried out for the purposed work

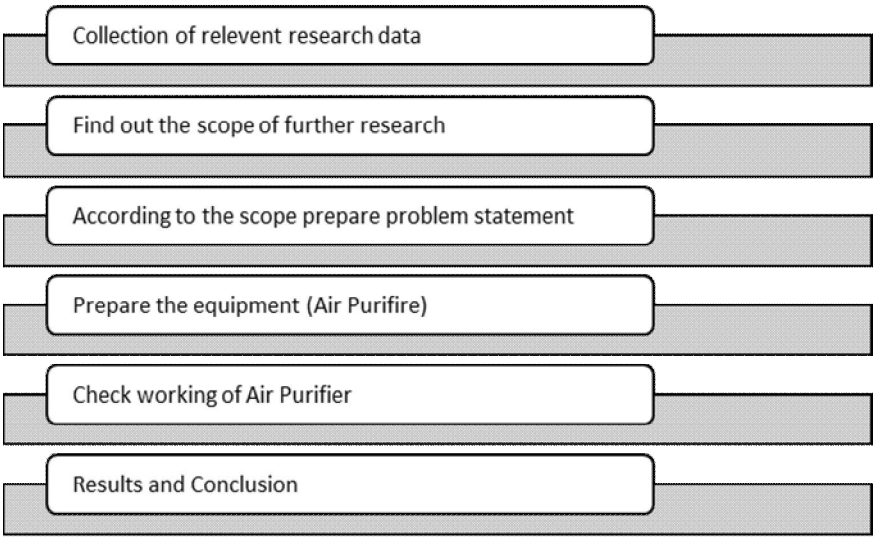


Fig. 1. Methodology

III. COMPONENTS

Centrifugal Fan 12V: To move air through a duct in your home, a centrifugal fan is generally utilized in domestic applications. Consider your furnace, range hood, or air conditioning system. These might also be present in commercial settings, such as your car wash. A DC motor has an internal configuration of magnets with diametrically opposed voltages. A powerful magnetic field is created as current flows through the coil encircling this configuration. The motor then rotates as a result of the torque produced by this magnetic field.



Fig. 2. Centrifugal Fan

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Box: The box material used to make it is mild steel, 1 mm thick. It is sliced with a laser before being constructed into a box.

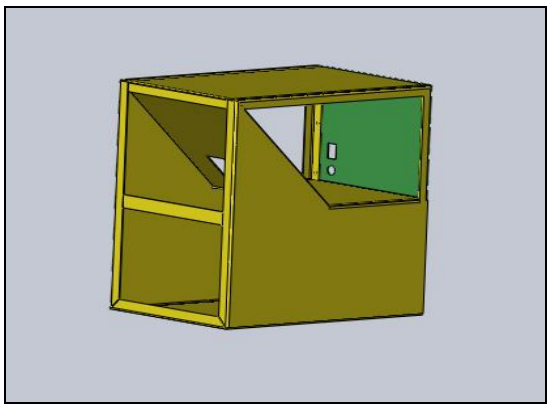


Fig. 3. Outer Cover or box

Protective Mesh: This is mounted within the box to stop heavy particles from getting in. It is constructed of mild steel with a 0.8Â mm thickness.

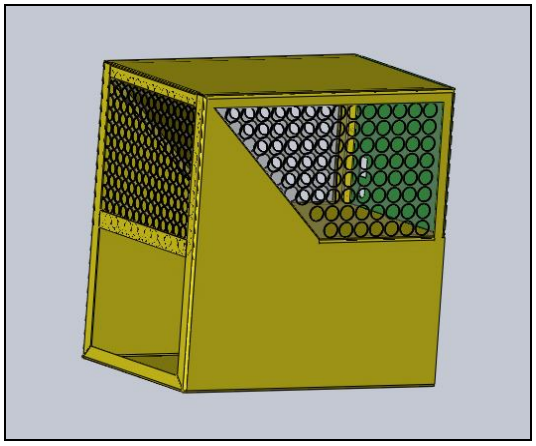


Fig. 4. Outer Cover or box

IV. WORKING MECHANISM

The motor, fan, screen for the air filter, and other systems account for a significance of the air purifier. The machine's motor and fan circulate the air inside, and the polluted air is then removed from the space or absorbed after passing through the air filter screen inside the machine. Some models of air purifiers also implement a negative ion generator at the air outlet (when operating, the high voltage in the negative ion generator will produce DC negative high voltage), which will continuously ionize the air and generate a significant amount of negative ions.

V. FUTURE SCOPE

The increase in outdoor pollution in Indian cities is mostly caused by an increase in the number of vehicles on the road, intense construction, and industry. It is clear that with a booming economy with more than 125 billion people to feed, more trees will be felled and land will be made available for infrastructure. Therefore, these activities will have repercussions. All of these are becoming hazardous, starting with the groundwater, the crops, and the air. Obviously, the future generations will pay a high price for our careless behaviour.

We require awareness and actions that can, at the very least, lighten the load on our one and only planet.

The majority of us is in charge of how much food and drink we consume, but the air we breathe are completely neglected. The increase in respiratory complaints, particularly in youngsters, indicates that pollutants are having a serious negative impact on the respiratory system. Additionally, it is obvious from the rise in your visits to the doctor or medication.

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Wheezing, sneezing, coughing, asthma, and a number of other illnesses, such as heart attacks and lung cancer, are all brought on by air pollution. In order to prevent pollution from entering the air and maintains a clean and pure atmosphere, it is crucial to do more than only filter the air inside of buildings. Air purifiers are just as important in the modern world as water purifiers.

Studies conducted by the British Allergy Foundation and others have shown that breathing air that has been cleaned and purified by Sharp air purifiers reduces the amount of toxins that enters our bodies, reducing the need for medicine or time off from work. Since they are overly focused on lowering dust or other particles and have been distracted from the real need and benefits that a consumer expects, this is absent from the majority of brand commitments.

VI. CONCLUSIONS

A new filter invention from this study will be used in an air purifier of the future generation. In comparison to rival products, the new filter enables smaller housing without sacrificing performance. As a result, it doesn't take up as much space and is simpler for the user to transfer from one location inside the residence to another. It also has a handle. Because of its less restrictive design than those of competitors, the 360^{o} Air can fit in more spaces in a home/ offices.

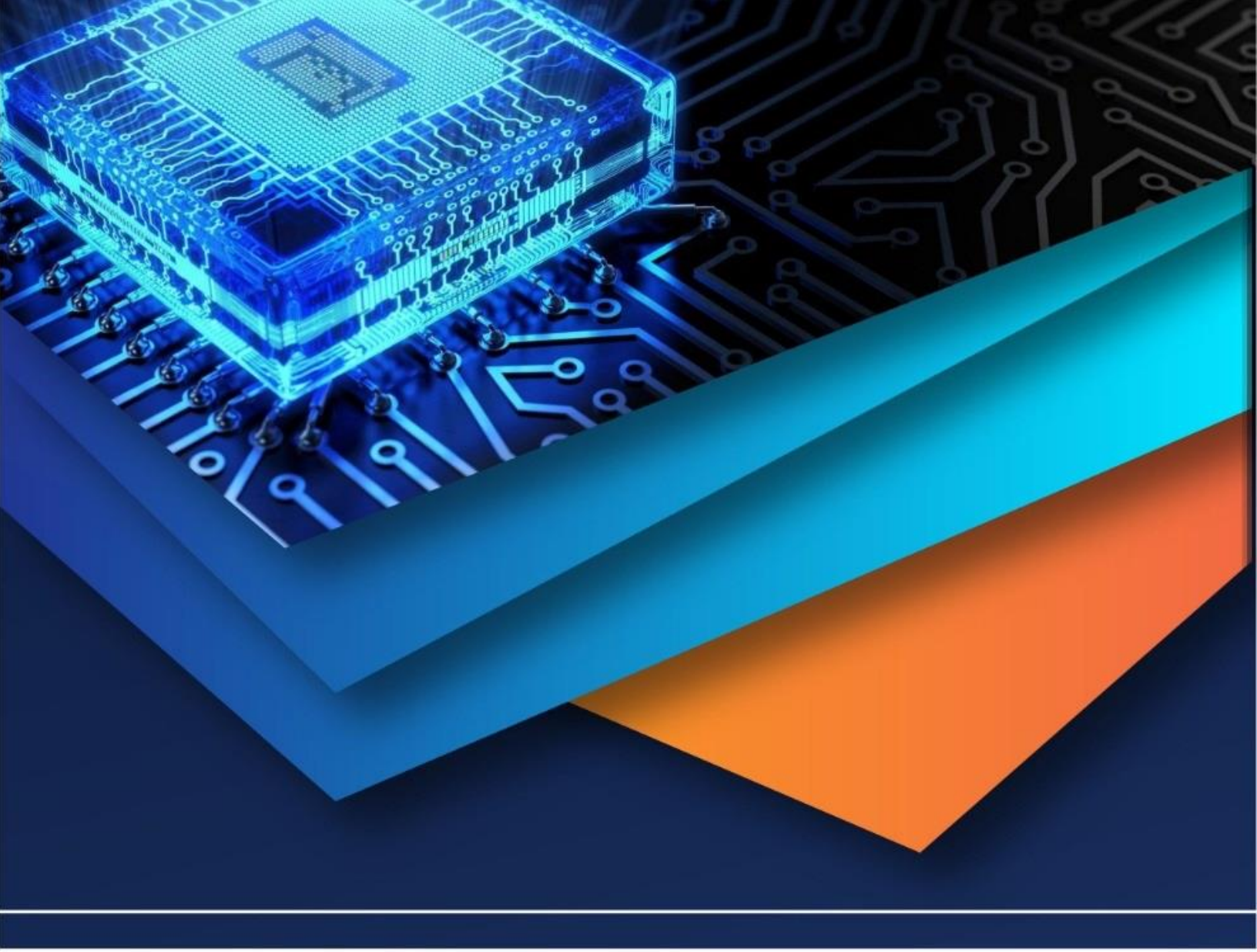
There is no need to replace the filter because it can be cleaned. Moreover, the filter has a minimal pressure drop, which reduces energy use and noise generation. With all these benefits resulting from the new filter technology, this product stands out from rivals, is simple for sellers to sell, and should bring in revenue for brand owners. A product that addresses the issue of poor indoor air quality is the air purifier. It is a problem that primarily affects big cities and areas with a dense population. Many people struggle to bear the expenses of changing filters and cannot afford air purifiers.

The 360^{0} Air is more socially responsible than the majority of its rivals since it is more affordable in the long run, allowing more people to purchase an air purifier that may be essential for their health. Because of the new filter innovation and its advantages that would draw in more users, the 360o Air should still be financially viable even if the brand owners, makers, and sellers did not profit from people routinely buying new filters. The 360o Air uses less material than its rivals, which will probably lead to lower manufacturing costs. As previously indicated, the air purifier created as part of this research is also more environmentally friendly than similar models now on the market.

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