

# Solar based air purifier

Sourav Rastogi<sup>1</sup>, Rajnandani<sup>2</sup>, Shreyash Sahu<sup>3</sup>, Mrs. Charu Tyagi<sup>4</sup>,

<sup>1</sup>Student, Dept. Of Electronics & Communication Engineering, RKGIT, UP, India

<sup>2</sup>Student, Dept. Of Electronics & Communication Engineering, RKGIT, UP, India

<sup>3</sup>Student, Dept. Of Electronics & Communication Engineering, RKGIT, UP, India

<sup>4</sup>Asst. Professor, Dept of Electronics & Communication Engineering, RKGIT, UP, India

## ABSTRACT

We 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. If you suffer from asthma or another breathing difficulty, you may find a (sometimes defined as "high-efficiency particulate air," sometimes as "high-energy particulate arresting") air purifier (or a vacuum with a filter) well worth the investment. we are going to make an ARDUNIO Based Air Pollution Monitoring System in which we will monitor the Air Quality over a web server using internet and will trigger a alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO<sub>2</sub>, smoke, alcohol, benzene and NH<sub>3</sub>. It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it very easily..

**Keyword:** - Arduino UNO, LCD Display, BLDC Motor, Purifier

## 1. 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, and if their efficiency is high, then they can also be used outdoors. In this project we are using Bluetooth wireless technology to control our robot car which is a very simple communication system. The remote in this project is an android device which has Bluetooth feature built in. Air purifier is a device used to remove contaminants like dust particles, cloth fibers etc. present in the air. These devices are claimed to be beneficial to people having allergies, and asthma. The commercially graded air purifiers are manufactured as either small stand-alone units or larger units that can be affixed to an air handler unit (AHU) or to a heating ventilation and air-conditioning (HVAC) unit found in the medical, industrial, and commercial industries. Air purifiers may also be used in industry to remove impurities such as CO<sub>2</sub> 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.

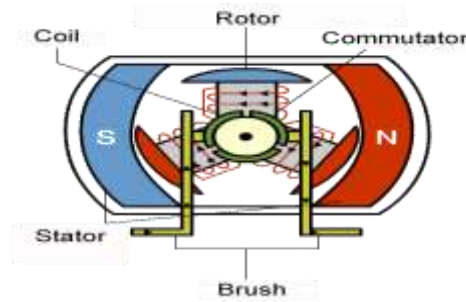
## 2. COMPONENTS REQUIRED

### 2.1 Battery:

It stores the amount of power generated by the piezoelectric and the solar panel that can be used in further generations.

### 2.2 BLDC MOTOR:

A motor converts supplied electrical energy into mechanical energy.



**2.3 DHT11 Sensor:** The DHT11 is a commonly used Temperature and humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data..

**2.4 Arduino UNO:** Arduino UNO is a microcontroller based on ATmega328P. It has 14 digital I/O pin.



Fig.3 AT mega 16

**2.5 Bluetooth Module (HC-05):** Zero level PCB is to mount the microcontroller, voltage regulator and IC's.

**2.6 Jumper Wires:** It is used as a connector between the components and the micro controller.

**2.8 LED:** A light-emitting diode is a semiconductor light source that emits light when current flows through it.

**2.8 Capacitor:** A capacitor is a device that stores electrical energy. It is a passive electronic component with two terminals



**2.9 LCD Display:**

An LCD is an electronic display module that uses liquid crystal to produce a visible image. The 16x2 LCD display is a very basic module commonly used in DIYs and circuits.



### 3. APPLICATION

Medical, Commercial, Institutional, Industrial, and Military Applications 58 Since 1985 Pure Air Systems, Inc. has been manufacturing commercial grade HEPA and carbon based air filtration systems for the commercial and residential markets. Here are some of the applications where are products are being used

1. Medical Hospitals: Use of HEPA systems in patient care rooms where either a positive or negative HEPA filtered environment is required. Typically used for infection control or isolation for communicable disease control. Clinics: Use of HEPA systems for reduction/removal of airborne pathogens, allergens and bacteria to maintain clean environment for outpatient procedures. Laboratories: Use of HEPA systems in medical labs and dental labs Pharmaceutical Manufacturing: Use of HEPA systems for containment of chemical compounds during the manufacture and development of pharmaceutical drugs

2. Institutional Universities: Use of HEPA and Carbon systems for R&D labs for reduction/removal of airborne contaminants and/or pathogens during various phases of the research cycle. 51 Pre-Schools and Secondary Educational Facilities: Use of HEPA systems in pre-schools to reduce levels of airborne pathogens and minimize spread of communicable disease. Use of HEPA systems in High Schools for overall air filtration of occupied areas.

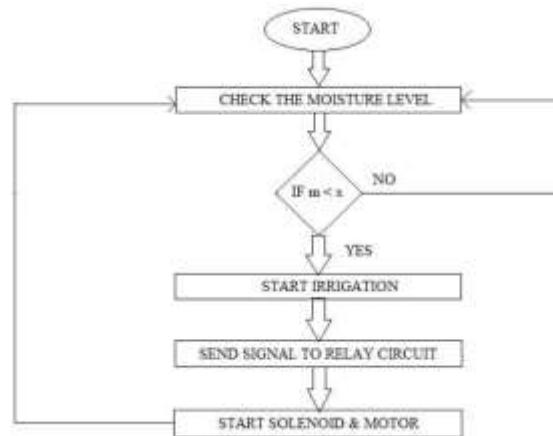
### 4. Filtering Process

The air circulating through the room that passes through the filter, the filter it passes through first is the carbon filter, where large contaminants get captured in the pores of active carbon. Then the air passes through cold catalyst filter there by removing any harmful gases like formaldehyde, 56 benzene gases and deodourizes the air. The third filter it passes through is antimicrobial filter where the microorganisms are stopped from spreading and growing. And finally the air passes through HEPA filters, where the minute contaminants, micro bacteria and fungus gets stopped, thereby effectively purifying the air. By adding a UV light to the

### 5. CONCLUSION

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 0.3 microns. So buy only a quality product from reliable sources and avoid buying "HEPA-Type" or "Hiplike" 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 Purified

### 6. FLOW CHART



## 7. FUTURE SCOPE

Increase in vehicular population, severe construction activities, and industries are largely contributing to an increase in outdoor pollution across Indian cities. It is quite evident that, with a growing economy and over 125 billion people to feed, the destruction will continue and more forests will be cut and space created for infrastructure. So there will be consequences for these actions. Starting from groundwater, the crops and the air – they are all becoming toxic. Obviously, the coming generations will pay heavily for this irresponsible action by us. What we need are consciousness and actions that can at least reduce the burden to the only planet that we have. While most of us have taken control of the food and water intake, but the air we breathe is ignored completely. Respiratory symptoms, especially among children are on the rise which signals in the effects of toxins that are causing severe damage to the respiratory system. It is also evident from the increase in your trips to the doctor or medication.

## 8.ACKNOWLEDGMENT

We are very grateful to our “Department of Electronics and Communications” for giving us the opportunity to participate in the amazing “Solar based air purifier” project. We would also like to thank our Head of Department Dr. R.K. Yadav without his support we would not have been able to achieve success in this project.

## 9. REFERENCES

Kim, Y.J., Maeng, K.H. and Lee, S.K., Koninklijke Philips NV, 2016. Air purifier. U.S. Patent Application 29/503,173.

- Tsai, P. and Malkan, S.R., University of Tennessee Research Foundation, 2002. HEPA filter. U.S. Patent 6, 428,610.

- Ao, C.H. and Lee, S.C., 2005. Indoor air purification by photocatalyst TiO<sub>2</sub> immobilized on an activated carbon filter installed in an air cleaner. Chemical engineering science, 60(1), pp.103-109.

- Klun, T.P., Dunshee, W.K., Schaffer, K.R., Andrews, J.F., Neu, D.M. and Scholz, M.T., 3M Innovative Properties Co, 2004. Hydrophilic polypropylene fibers having antimicrobial activity. U.S. Patent 6,762,339.

- Verdene Ili, M.C., Cecchini, C., Orpianesi, C., Dadea, G.M. and Cresci, A., 2003. Efficacy of antimicrobial filter treatments on microbial colonization of air panel filters. Journal of Applied Microbiology, 94(1), pp.9-15.

- Giokas, D.L., Salvador, A. and Chisvert, A., 2007. UV filters: from sunscreens to human body and the environment. *TrACTrends in Analytical Chemistry*, 26(5), pp.360-374.
- 54 Adams, P.C., Tau Systems, 1981. Air purifier and ionizer. U.S. Patent 4,253,852. Corcoran, P., Shurmer, H.V. and Gardner, J.W., 1993. Integrated tin oxide sensors of low power consumption for use in gas and odour sensing. *Sensors and Actuators B: Chemical*, 15(1-3), pp.32-37.

