IJIREEICE

ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 6, June 2021

DOI 10.17148/IJIREEICE.2021.9632

Air Borne Isolation System For Eliminating Disinfectiousness With Ac Assist And Air Purification

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Abstract: Air biology plays fundamentals role in transmission of infection disease. Exposure to airborne microbiological particles is a common denominator of all human life. With the improvement of research methods for studying airborne microbiological particles has come evidence indicating that microorganisms (e.g., viruses, bacteria, and fungal spores) from an may disperse over very great distance by air currents and ultimately be inhaled, ingested, or come into contact with individuals who have had no contact with the infectious source, But there is a lot of risk involved for the spaces which are operating with air conditioning system and creates a unique challenge because of the in air conditioning system having larger pores than the size of microbiological particles and this particles very easily pass through the air filter of the air conditioning system. After getting passed through this microspores this microbiological particles gets contaminated in the spaces or rooms which are operating with air conditioning system so an automatic sanitization system and air purification with ac assist should be development which enable to eliminate the infectious diseases and reduced the level of risk involved in AC operating system spaces. The automatic system should be able to detect time spray sanitizer and purify the air according to AC temperature. The automatic system should be feasible to operate with low maintenance, low cost, the system should provide a detailed report to operator about the quality of air, energy consumption, level of liquid sanitizer available in trunk to maintain constant operation, the amount of remove microbiological particle. Basically real time monitoring system.

Keywords: Peltier module, arduino uno, ac, microbiological particles, sanitization system.

I. INTRODUCTION

Air biology plays fundamentals role in transmission of infection disease. Exposure to airborne microbiological particles is a common denominator of all human life. With the improvement of research methods for studying airborne microbiological particles has come evidence indicating that microorganisms (e.g., viruses, bacteria, and fungal spores) from an may disperse over very great distance by air currents and ultimately be inhaled, ingested, or come into contact with individuals who have had no contact with the infectious source. Suspended air particle present in atmosphere: Pollens, flays, smog, smoke, viruses, pathogens, bacteria, soot, dust.. Particulate air pollution is a mixture of solid, liquid or solid and liquid particles suspended in the air. These suspended particles are different in size, composition and in their origin. It is convenient to classify particles by their aerodynamic properties because: they govern the transport and removal of particles from the air; they also govern their deposition within.

II. LITERATURE REVIEW

CONTAMINATION TIME REQUIRED FOR SAR-VIRUS

- Aerosols 3 hours
- Plastic 72 hours
- copper and
- cardboard 24 hours
- stainless steel 48 hours

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- **Types OF AC FILTERS USED**
- HEPA - 99.97% efficient HOSPITALS,PHARMACEUTICALS
- Ionic Filters - 50% efficient Very popularly used in domestic and commercial ventilation system
- U.V filters – 30-40% efficient Vehicles ,Photography
- **Different sizes OF Microbiological Particles**
- Pollens 15 to 200 µm
- Bacteria 0.2 and 2.0 µm
- SAR-COVID-19 VIRUS range between 60 nanometers (nm) to a maximum diameter of 140 nanometers (nm)
- Chow et al studied the composition of fine particles (PM2.5) and PM10 in California's San Joaquin Valley.
- Hildemann et al showed that industrial-scale boilers, fireplaces, cars with and without catalytic converters, diesel trucks and meat cooking operations all emit particles primarily in the range 0.1–0.2 µm.
- Schlesinger has observed that toxicological data support the available epidemiological data to the extent that airborne ambient particulate matter has been shown to be able to produce adverse biological responses.
- Pope et al. studied daily mortality in relation to PM10 pollution in Utah Valley for the period from April 1985 to December 1989 .
- Schwartz studied the relationship between PM10 and daily mortality in Birmingham, Alabama over the period 1985–1988. PM10 averaged 48 µg/m^3, and the highest 24-hour value was 163 µg/m^3.

III. PROJECT DEFINATION

The primary objective of the project is to eliminate the transmission of infectious diseases and reducing the concentration of microbiological particle released during air conditioning. This project aims to develop a feasible and cheap solution for real time monitoring with IOT assist air purification and sanitization system.

IV. PROJECT OBJECTIVE

- To find a feasible & cheap solution for problem related to Air Purification.
- To provide a compact module which will be simple to use and easy to operate and low maintenance.
- To provide a better solution than a ionic air purifier.
- To make the real time air quality monitoring, Microbiological particle reducing and sanitizer level indication in one system.

V. SYSTEM SPECIFICATION

Fig. 1

1. Temperature and Humidity Sensor :DHT11

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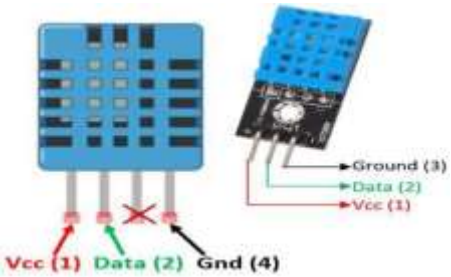

Fig. 2 Temperature Sensor

It is used to indicate the ambience temperature to the user DTH11 temperature sensor is used which as following features, as output voltage is linearly proportional to the Celsius (centigrade) temperature. Does not require any external calibration to provide typical accuracies of temperature. So we are using it for measurement of temperature and Humidity of indoor or house.

2. Gas Sensor: MQ-2 Sensor:

Fig. 3 Gas Sensor

We are using packaged gas/smoke sensor which is shown in fig. which itself consist of buzzer. This gas smoke sensor gives output in terms of logic high and logic low, so we can directly interface it to Arduino uno board without using any signal conditioning. As gas/smoke enters the detector, it causes a reduction of the current flow in and hence an increase is the voltage measures at the junction between the two chambers. The voltage increase is monitored by the electronic circuitry, which triggers the detector into the alarm state at a present threshold. An externally visible LED will light up the detector changes to alarm state.

3. Peltier Module :

Fig. 4 Peltier Module

It works on peltier principle effect creates a temperature difference by suppling heat in two electrical junctions.

4. Water Pump :

Fig. 5 Water Pump

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Pumps operate on 6, 12, 24, or 32 volts of DC power. When sunlight falls on the solar panels it produces direct current (DC) which then feeds the motor to pump out the water.

5. Nano Mist Sensor:

Fig. 6 Ultrasonic Mist Sensor

The piezo mist maker works on the principle when the high frequency waves are transfer into mechanical energy and it is transferred in a liquid it creates standing wave.

6. Arduino / Controller :

Fig. 7 Arduino Controller

It is an open source electronic platform based easy to use controller / hardware and software. It can read input taken from the sensors like light sensor, gas sensor etc.

7. ESP 01 (WIFI Module) :

Fig. 8 ESP Module

This is wifi module it allows controller to access the wifi network. It has self contained SOC that is system on chip that doesn't necessarily need any other controller to take input and output as we do with an arduino or any other controller.

8. DC Fan :

Fig. 9 DC Fan

It is used for cooling purpose.

9. Relay Module:

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Fig. 10

The relay module is an electrically operated switch that allows you to turn on or off a circuit using voltage and/or current much higher than a microcontroller could handle. There is no connection between the low voltage circuit operated by the microcontroller and the high power circuit. The relay protects each circuit from each other. The each channel in the module has three connections named NC, COM, and NO. Depending on the input signal trigger mode, the jumper cap can be placed at high.

VI. PROJECT SPECIFICATION

- Temperature range in between 18 – 30 degree Celsius.
- Air quality in between 50 AQI – 150 AQI.
- Particulate matter size in range PM 10 – PM 2.5.

VII. METHODOLOGY

- For a compact AC module peltier module is used which is popular as inverter low consumption refrigeration element. The exhaust fans and heat sink will be work as one unit to cool the peltier module by hot side.
- Temperature sensor is used with a threshold of 20DC and will be an input element to controller for the regulation of gas sanitizer.
- 400w induction coil is used to heat the liquid sanitizer and to release in contaminated zone.
- A sanitizer level indicator with alert bell so that the user will get notified about the exact sanitizer level.
- Wi-Fi module is used with air purifier, air quality sensor and air flow sensor as an notified to get the detailed report of how much contaminated particles is being reduced or eliminated.
- Pump is used to convey the liquid sanitizer to gasifier module.
-

VIII. BLOCK DIAGRAM

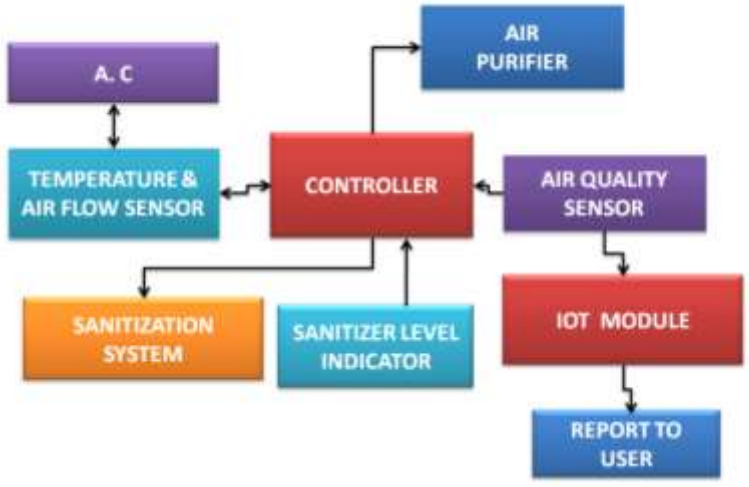

Fig. 11 Block Diagram

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IX. ALGORITHM

- POWER-ON THE HARDWARE
- CONTROLLER WILL SENSE TEMPRETURE OF AC AND AIR QUALITY
- CONTROLLER WILL REGULATE THE PUMP SPEED AND FLOW RATE OF LIQUID SANITIZER TO GASIFIER
- CONTROLLER WILL MONITER THE TIMER ACCORDING TO THE BASE TEMPRETURE OF AC
- AFTER THE COMPLETION OF PROCESS CYCLE CONTROLLER WILL CHECK THE LIQUID SANITIZER LEVEL IN THE LIQUID SANITIZER TANK.
- CONTROLLER WILL MONITOR THE AIR QUALITY AND DETAILED REPORT WILL BE SEND TO THE USER
- END
- STOP

X. FLOW CHART

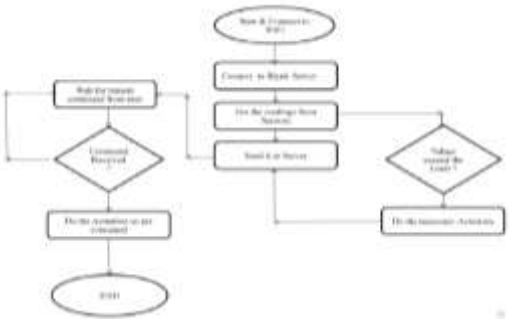

Fig. 12 Flow Chart

XI. ADVANTAGES

- Reduces presence of microbiological particles in the air.
- Eliminate airborne diseases.
- High efficient air purification
- Reduces respiratory diseases
- Faster sanitization
- Real time monitoring.

XII. APPLICATIONS

- Home isolation and sanitization.
- In school and college classrooms.
- In hospitals.
- Public places or crowded room.

XIII. RESULTS

Fig. 4 Peltier AC

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XIV. CONCLUSION

The above project shows that the current air conditioning system uses ionic filters which has larger pores through which the microbiological particles get passed and according to the reports such particles takes 3 hours to contaminate and such critical problem required a cheap and safer solution which can eliminate this particles before they get contaminated. Such system to be replaced by and another system which can easily. Such project will sure create a market boom because there is no such device currently present in market which can resolve these critical issues.

ACKNOWLEDGMENT

We would like to thank all who have helped us in completing this project. We would like to thank our guide and H.O.D of ECE Department, Sanjivani College of engineering, kopargaon for providing us an opportunity to work on project air brone isolation system for eliminating disinfectiousness with ac assist and air purification.

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