Power Filtration Integrated Head Protection Basinet Gear

AyushiJaiswal[1], Chandradeep Sonagote[2], Sourabh Wahane[3], Sanket Maske[4], Pranay Kothare[5], Shubham Jivtode[6], Shashank Singh[7]

[1]Assistant Professor, Department of Electronics and Telecommunication Engineering, S B Jain Institute of Technology, Management & Research, Kalmeshwar Road, Nagpur, Maharashtra 441501.

[2,3,4,5,6,7] UG Student, Department of Electronics and Telecommunication Engineering, S B Jain Institute of Technology, Management & Research, Kalmeshwar Road, Nagpur, Maharashtra 441501.

Abstract-*Air pollution can effect our day-to-day activities and quality of life. It also creates a threat to the ecosystem and the quality of life on the planet. The desire need to monitor air quality is very glaring, in many aspects owing to increased industrial activities over the past years. People can also need to know the extent to which their activities affect air quality. This project proposes a Power Filtration Integrated Head Protection Basinet Gear monitoring and controlling system. The system was developed using the NodeMCU microcontroller. This system was designed to filter the polluted air with the use of HEPA filters, keeping the continuous flow of fresh air. Air quality is analyzed for designing this powerful filtration system. The air quality measurements taken by the designed system were accurate and displayed on the Mobile Application and the hardware's interface could be accessed via the cloud on any smart mobile device so as to control the speed of the filtration process. Here the High-efficiency particulate air (HEPA) filters are used as the primary technology used for particle removal in individual and collective protection applications. This filtration process taken with the help of a rotor fan and the fresh air passes through the hollow pipe. GPS Module is also integrated with the system so as to locate the exact location of the device in any accidental condition.*

KeyWords-Internet of Things, Pollution, Air Quality and HEPA Filter.

1. INTRODUCTION

The main objective of the Air Purifying System is that Air pollution is a growing issue these days. It is necessary to purify our surrounding's air quality and keep it under control for a better future and healthy living for all. Due to the low-cost Internet of things (IoT) is getting popular day by day. With the Urbanization and with the increase in the vehicles on the road the atmospheric conditions have considered very harmful for us.

2. Literature Survey

In this paper "An environmental monitoring system using IOT"Dr.A. Sumitra, J. Jane, K. Kartika in the year 2016 Proposed, the science and engineering professions have been heavily influenced by their responsibilities to society. This responsibility is directed towards the protection of public health and welfare. In devising controls for the emission of pollutants, scientists and engineers have developed strategies for monitoring the environmental pollution problems. The pollution monitoring system is using wireless sensor network in Visakhapatnam published by P.Vjnattha, R. Arvind, B. Sangeet Kumar in the year 2013 Proposed that the technology increase, the degree of automation (minimizing the manpower) in almost all sectors are also increasing. Wireless Sensor Networks (WSN) is gaining ground in all sectors of life; from homes to factories, from traffic control to environmental monitoring. International Journal of Scientific & Engineering Research Volume 9, Issue 2, and February-2018 these lead to sparse leads to the release of a lot of IJSER gaseous pollutants. Harmful development of themonitoring stations. The locations monitoring stations and filtration need careful placement because the air pollution situation in urban areas is highly related to human activities (e.g. construction activities) and location-dependent.

3. METHODOLOGY

Proposed system is having four major building boxes-

- NodeMCU
- GPS module
- Rotor Fan
- HEPA Filter

3.1 NodeMCU

NodeMCU is a generic WiFi-BLE MCU module and it has a high capacity to targets a wide variety of applications ranging from low-power sensor networks to the most demanding tasks such as voice encoder, music streaming applications, and MP3 decoding software. At the core of this module is the NodeMCU chip, which is designed to be scalable and adaptive. There are two CPU cores that can be individually controlled or powered for providing the proper clock, and the clock frequency is adjustable from 80 MHz to 240 MHz The user may also power off the CPU and can lower power consumption, coprocessor to constantly monitor the peripherals for changes or crossing of thresholds. ESP32 integrates some set of peripherals, like capacitive touch sensors, Hall sensors, SD card interface, Ethernet, high-speed SDIO/SPI, low noise sense amplifiers UART, I2S, and I2C.

Fig -1: NodeMCU

3.2 GPS Module

The NEO-6M module is a GPS (Global Positioning System) module and is used for the navigation systems. The module simply checks the exact location on earth and provides output data in the longitude and latitude of the position of the user. It is a stand-alone GPS receiver featuring high-performance. U-Blox6 positioning engine. This GPS module is flexible and cost-effective receivers offer numerous connectivity options in a miniature (16 x 12.2 x 2.4 mm) package. The compact design, architecture, power, and memory options make NEO-6 modules ideal for battery-operated devices with very sensible cost and space constraints. Its Innovative design gives NEO-6M an excellent navigation performance even in the most challenging environments. And it successfully delivers the location information.

Fig -2: GPS Module

3.3 HEPA Filter

A particulate air filter is a device composed of fibrous or porous materials which remove solid particulates such as dust, pollen, mold, and bacteria from the air. Filters containing an adsorbent or catalyst such as carbon may also remove odors and gaseous pollutants such as volatile organic compounds or ozone from the air for better purification of air in many ways. Air filters are used in applications where the air quality of a particular region is important, and these filters provide air filtration processes notably in building ventilation systems and in engines. Some of the buildings, as well as aircraft and few other human-made environments (e.g., satellites and space shuttles), use foam, pleated paper, or spun fiberglass filters elements. Another method, air ionizers, use fibers or elements with a static electric charge, which attract dust particles, and the purification of air is done. Typical Oil bath filters have fallen out of the tradition. This type of technology of air intake filters of gas turbines has improved providing the new types of filters known as HEPA filters.

Fig -3: HEPAfilter

NodeMCUis the controller which is controlling the complete process. GPS module used to send GPS data via Serial communication at 9600 baud rate. NodeMCUwill receive the data and decode it to get latitude and longitude. Decoded data will be sent on Blynk server to reflect on Blynk Android/IoS app. We have added a slider widget on the Blynk app to control the speed of the rotor fan. HEPA filter is placed for purification of air. Along with this, we have some hardware structure of the system. Battery Pack, NodeMCU are placed inside the hollow pipe. GPS module is mounted on the surface of the duct pipe. HEPA filter is mounted vertically and at another end, it is covered with a rotor fanproviding proper insulation for the system. The rotor fan will suck the air through the HEPA filter and pass through the duct pipe to the user. Proper insulation is provided for the filtration process, and the specified nozzle is placed inside the head protection gear.

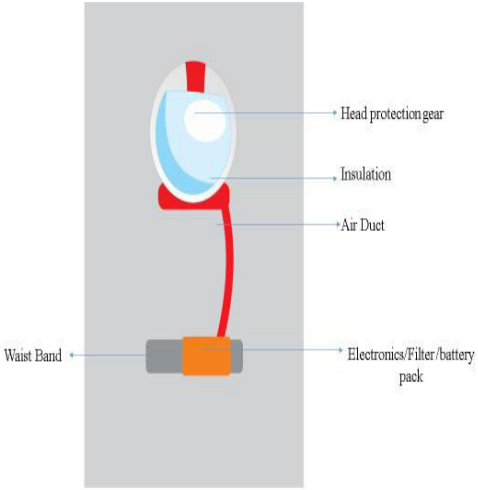

Fig-4: ProjectedView

4. RESULT

This implementation of the proposed system using NodeMCU, interfacing with GPS module can able to track the live location of the user, with the use of Blynk software. Also, this proposed system can filter air through a HEPA filter. This is quite a significant project for its originality and concept. We are using the Internet of Things theory which gives this project its uniqueness about the concept of the filtration system. The project aim to filtration of the air in the surrounding. Another very important aspect of our project is the Mobile Application portal that is designed in such a way that operators and citizens both will find it easy to use. This monitoring device can deliver the real-time location of the user with the help of Blynk application.

Fig 5 shows the Blynk software interface in an android/Ios application, the slider is added to control the speed of the rotor fan; also it can monitor the speed of the user. Below that the live location of the user is shown with the use of GPS module, actually the GPS module shares the location with NodeMCU, and then it is transmitted via NodeMCU to the Blynk server. Fig 6 is the actual system picture. For the head protection, we are using a helmet but this system is compatible with any other head protection gear, provided the proper insulation is there which can prevent loss of fresh air.

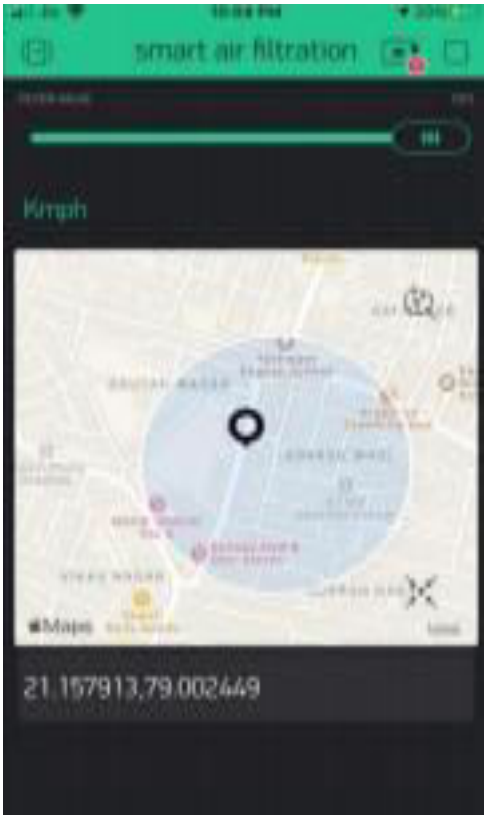

Fig -5: BlynksoftwareInterface

Fig-6: Actualproject image

5. CONCLUSION

This research proposed a smart air filtration system that constantly keeps track of the location of the user and displays the live location on the Android application with this Blynk mobile application. Speed of rotor fan can be controlled from the application so as to get fresh air.

REFERENCES

[1]Sammarco, M., Tse, R., Pau, G. and Marfia, G., 2017. Using geosocial search for urban air pollution monitoring. Pervasive and Mobile Computing, 35, pp.15-31

·[2]Völgyesi, P., Nádas, A., Koutsoukos, X., and Lédeczi, Á. 2008, "Air Quality Monitoring with Sensor Map", In Proceedings of the 7thinternational Conference on information Processing in Sensor Network.

[3] International conference on emerging trends in Engineering, science and management 17th and 18th march 2017. IOT BASED NOISE AND AIR POLLUTION MONITORING SYSTEM USING RASPBERRY PI ,Uppugunduru Anil Kumar .

[4] A., Putra, J. C. P., &Rahman, I. B. A., "A Study of Indoor Air Quality of Public Toilet in University's Building", in Humanities, Science and Engineering (CHUSER), IEEE Colloquium .

[5] Haija, Q. A., Al-Qadeeb,H.,&AlLwaimi, A.,"Case study: Monitoring of air quality in king Faisal University using a microcontroller and WSN", Procedia Computer Science, volume.

[6] An intelligent automated emission quality monitoring system designed to test the vehicles in the signals", IEEE conference on Green Computing.

[7] Diego Méndez, Alfredo J. Pérez, Miguel A. Labrador,Juan José Marrón, "P-Sense: A participatory sensing system for air pollution monitoring and control"(Department of Computer Science and Engineering, University of South Florida, Tampa, USA) Published on IEEE at: 12 May 2011 , DOI: 10.1109/PERCOMW.2011.5766902.

[8] JiongJin, JayavardhanaGubbi, SlavenMarusic, MarimuthuPalaniswami, "An Information Framework for Creating a Smart City Through Internet of Things,"Published in: IEEE Internet of Things Journal (Volume: 1, Issue: 2, April 2014) DOI: 10.1109/JIOT.2013.22965168.

·[9] A. R. Al-Ali, Imran Zualkernan, and FadiAloul, —A Mobile GPRS-Sensors Array for Air Pollution Monitoring,‖ IEEE SENSORS JOURNAL, VOL. 10, NO. 10, OCTOBER 2010

12] Daw Thin Htwe, Dr. KyawHlaing published a paper on "Arduino Based Tracking System Using GPS and GSM" (International Journal of Advance Research and Development -2019)

[13] Kumar, SomulaRamasubbareddy published a paper on "IOT based Air Quality Index Monitoring System" (VIT University-2019)

[14] EmeliDey, Urvashi Choudhary, Swapan Kumar Ghosh published a paper on "surface modification of textile fibre by High Efficiency Particulate Air (HEPA) Filtration process"(American journal of engineering research-2017)

[15] Tatsuo Horiba published a paper on "Li-ion battery Systems" (The Institute of Electrical and Electronics Engineers-2014)

[16]DhrubajyotiGogoi, Rupamkumar Sharma published a paper on "Android Based Emergency Alert Button" (International Journal of Innovative Technology and Exploring Engineering -2013)