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IOT BASED ENVIRONMENT MONITORING SYSTEM

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Abstract : Indoor air quality defines the quality of air in a premise, which intern refers to the health and comforts of inhabitants. The microbial action which depends on surrounding temperature and humidity, gaseous pollutants, dust particles etc. affect the IAQ. These pollutants can adversely affect the health of building occupants. To overcome this problem an air quality monitoring system is necessary. As a solution a toolkit has been developed to view the live air quality.

IndexTerms **- IOT, Blynk Cloud, AQI.**

I. INTRODUCTION

The proposed paper is an IOT based application to deal with air pollution. How it works and what are all the models present will be explained. The aim of the paper is to provide an IOT based solution to tool (air pollution) with the help of sensor such as mq135 various air parameters can be sensed. To transmit sensed elements we need one development board and we are going to use NODE MCU. The proposed prototype with the help of Wi-Fi it uploads all fetched information of air into satellites. This is the overall idea of paper. It's an IOT based application it makes use of an sensor. The heart of the paper is NODE MCU development board and with help of Wi-Fi the read parameters are uploaded to centralized server.

II. REVIEW OF LITERATURE SURVEY

If we talk about conventional monitoring system, they are much expensive and consume a lot of space and is not ideal for indoor applications. We also come across many systems where the system reads wrong concentration of pollutants. This happens when the sensors used are not calibrated properly before using it. These problems have been solved by us by making a portable system, keeping in mind about the cost. And also, we have calibrated all the sensors properly and as we have used IOT, the user can get to know about the pollutants through the use of cloud in addition to the LCD screen.

III. PROBLEM DEFINTION AND PROPOSED METHOD

The proposed system is IOT based paper and all functional units present in the proposed system connected in network. Since all the things such as sensors, servers they work together over an network and they communicate easily each other. The data which is collected from sensors get upload to cloud servers instantly with mobile. This helps authority such as pollution control board authorities to fetch the data easily and with the help of real time data they can take conclusions/actions instantly .This is the advantage of proposed system.

IV. COMPONENTS REQUIRED

4.1 Hardware requirements

1. Temperature (DS18B20)
2. Air Quality sensor (MQ 135)
3. Dust Sensor (PM2.5G)
4. DC Fan
5. Potentiometer
6. 16x2 LCD Panel
7. Node-MCU
8. Microcontroller (ATMEGA 328PU)
9. For Power Supply
   - 9v and 1A for Microcontroller
   - 5v and 1A for Node-MCU
   - 9v Battery for DC fan

4.2 Software requirements

1. Arduino IDE
2. Blynk App

Temperature Sensor (DS18B20)

DS18B20 is a digital temperature sensor the Fig 1 shows which can measure the temperature range –55°C to +125°C (-67°F to +257°f) with an accuracy of +-5% and follows the 1-wire protocol. This sensor can be controlled via a single pin of microcontroller as it follows 1-wire protocol. This sensor consumes only 1mA of current during active temperature conversions and can be powered with a 3V to 5.5V power supply.

Fig 1. Temperature Sensor

Air Quality Sensor (MQ135)

MQ135 gas sensor the Fig 2 shows is sensitive towards ammonia (NH3), carbon monoxide (CO), CO2 and other hazardous gases that impact the air quality. The MQ-135 sensor it's a low-cost sensor. The sensor layer which is made from tin dioxide (SnO2) and inorganic compound which has lower conductance in clean air than when infectious gases are present.

Fig 2. MQ135

Dust Sensor (PM2.5G)

GP2Y1014AU0F the Fig 3 shows is an Analog output optical air quality/optical dust sensor which has a 6 pins and is supposed to sense the dust particles present in the air. It uses the Laser Scattering principle to detect very fine particles like smoking cigarette, and it is commonly used in an air purifier systems. This sensor incorporates an infrared emitting diode and a phototransistor. It normally works with 5.0V DC voltage and it conducts a maximum of 20mA current**.**

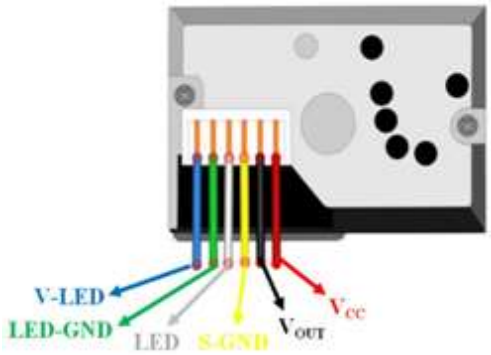

Fig 3. PM2.5 (Dust sensor)

DC Fan

A DC motor the Fig 4 shows is a mechanical device which translates direct current electrical energy into mechanical energy. Most of the DC fans rely on the forces produced by magnetic field. General voltage values for dc fans are 5V, 12V, 24V and 48V. They can be deployed in severe environmental conditions.

Fig 4. DC Fan

Potentiometer

A potentiometer the Fig 5 shows is a resistor with three-terminal and with an adjustable voltage divider. Using potentiometer, the flow of current is controlled, by manually varying the resistors.

Fig 5. Potentiometer

16X2 LCD Panel

A 16x2 liquid-crystal display (LCD) the Fig 6 shows is a very compact, low power consumption optical device. The instruction which is given to the lcd is stored in command register. It has two lines and can display 16 symbols per line.

Fig 6. LCD

Node-MCU

Node-MCU the Fig 7 shows is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is predicated on the ESP-12 module. The term "Node-MCU" by default refers to the firmware instead of the event kits. The firmware uses the Lua scripting language.

Fig 7. Node-MCU

Microcontroller (ATMEGA 328PU)

ATMEGA 328PU the Fig 8 shows is a 8-bit microcontroller with advanced RISC architecture. It is used to take the Analog voltage from the sensors and provide the output to the displaying units.

Fig . ATMEGA 328PU

Software requirements

Arduino IDE

The Arduino Integrated Development Environment (IDE) is an application (which has been developed for Windows, macOS, Linux) that's written in functions from C and C++.The programs to Arduino compatible boards are uploaded with the assistance of Arduino IDE.

Blynk Application

Blynk helps us to interact with microcontrollers or even full computers such as Raspberry Pi by creating smart phone applications.

V. CIRCUIT DIAGRAM AND METHODOLOGY

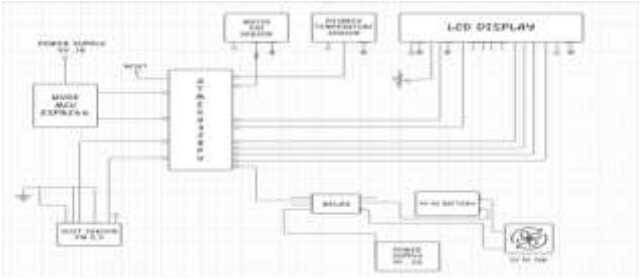

Fig 9. Circuit diagram

The working of the proposed mode is based on the above circuit diagram. When power supply is given, the gas sensor MQ135 which is used to detect the concentration of CO2 and CO will provide the information in the form of voltage to the microcontroller. This goes same with the dust sensor (PM2.5) as well as with the Temperature sensor. The microcontroller then takes the input from the sensors and with the help of suitable programming the voltage is converted into PPM, ug/m^3 and temperature respectively. These converted values are then displayed on the LCD screen and also these values are sent to the Node-MCU. The Node-MCU will send the data to the cloud with the support of internet. As a result, the values will be displayed in the Blynk app. In case if the surrounding temperature goes past 30 °C the exhaust fan will turn on immediately. The exhaust fan will run until the temperature falls below 30°C.

VI. APPICATIONS

1. Indoor air quality monitoring.
2. It can be used in School, Office.
3. It can be used in Hospital
4. Industrial perimeter inspection.
5. Street pollution control.
6. Data availability is easier to the common man in the society.

VII. ADVANTAGES

1. Sensors are readily available. Simple, covenant, easy to handle them.
2. Sensors have durability and cost effectively.
3. We can check the indoor and outdoor air quality.
4. It can Detect a diverse range of anatomical parameters in addition to temperature, carbon monoxide and carbon dioxide

VIII.RESULT

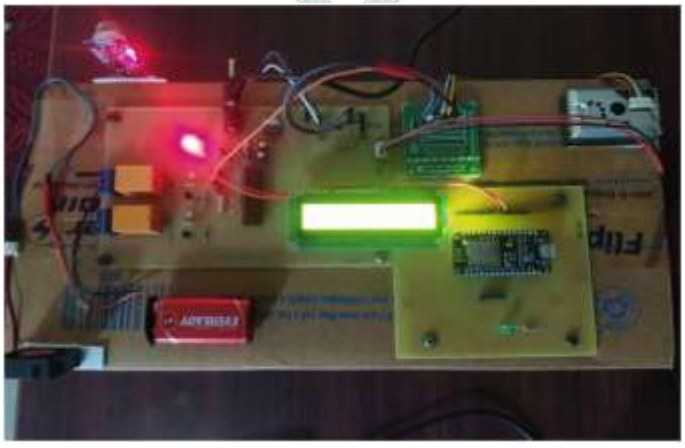

Fig 10: Final model of the paper work

The air quality (AQI values) is been checked, and data collected from the sensors is displayed in the LCD.

IX.CONCLUSION

The indoor environment quality plays a vital role in maintaining good health of the occupants. We will be able to take necessary action to reduce the indoor air pollutants if we know what all pollutants are there and to what extent they are. With the proposed model we can exactly achieve this effectively and at a low cost.

REFERENCE

1. Montgomery. K, Chiang. K, "A New Paradigm for Integrated Environmental Monitoring", *ACM International Conference Proceeding Series*, 2018.
2. Bamodu O, Yang T, Halim D. Numerical investigation of thermal comfort in an office room with 4-way cassette air-conditioner. *In Proceedings of the 8th Conf. Int. Forum Urban*. 2015.
3. João Ramos Maria, João Dias, "Analyses of Indoor Environmental Quality and Ventilation in a Building of a School of Higher Education in Portugal", *in the 4th Advanced Research in Scientific Areas conference*,pp.273-278,1Nov2015.
4. J. Jo, B. Jo, R. M. A. Khan, and J. Kim, "A cloud computing-based damage prevention system for marine structures during berthing," *Ocean Engineering*, vol. 180, pp. 23–28, 2019.View at Publisher Site | Google Scholar
5. C. Stergiou, K. Psannis, B. Kim, and B. Gupta, "Secure integration of IoT and cloud computing," *Future Generation Computer Systems*, vol. 78, pp. 964–975, 2018.
6. https//securedstatic.greenpeace.org/india/Global/india/Airpoclypse--Not-just-Delhi-Air-in-most-Indian-cities-hazardous--Greenpeace-report.pdf
7. DS18B20.[Online].Available http//www.maximintegrated.com/en/products/DS18B20.html.
8. https//www.elprocus.com/mq-135-alcohol-sensor-circuit-and-working/
9. S. Kamble, S. Mini, and T. Panigrahi, "Monitoring Air Pollution An IoT Application," in 2018, *International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)*, Chennai, India, March 2018.