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Review Paper on IOT based Design System for Checking Atmospheric Habitability

Navneet Kumar Gautam[1], Kumar Saurabh[2], Suyash Johri[3], Tarun Chaudhary[4]
[1,2,3,4]*Degree of Bachelor's of Technology, Deptt. of Computer Science & Engineering IMSEC, Ghaziabad, U.P., India*

Abstract : Problem of air pollution is increasing each and every second and day by day. To measure the level of air pollution, we were planning to design an IoT based system for cheating atmospheric habitability i.e. Air quality Monitoring System. The main objective is to prevent the harmful effects of pollutants present in air so that healthy surroundings can be maintained using telemetry. Air quality index were sensed gases like PM10, PM2.5, CO etc. and displayed each and every calculation in the LCD display. If these gases exceed the normal level then an alarm is generated immediately. Aim of this paper is to highlight some technology which can monitor air pollution.
Keywords: Smoke Sensor (MQ135), Temperature / Humidity (DHT11), Carbon Monoxide (MQ7), Air quality, real time monitoring.

I. INTRODUCTION

With the fast growing technology, it would be great to get to know about our surrounding whether parameters in this widely connected environment of internet. Environmental monitoring is a systematic approach for observing and studying the condition of environment. Oxygen we inhale is present in the air survival of human beings. Air pollution is a growing issue those says. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. The basic mission of the air quality planning and standards is to preserve and improve the quality of our nation's air. The level of pollution in air can be measured by measuring the pollutant's such as humidity level, temperature level, dust level, CO level, methane level, CNG, smoke level, alchol level present in the air of that area. Here we propose an air quality pollution monitoring system that allows us to monitor and check live air quality in a particular areas through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. The sensors interact with microcontroller which processes this data and transmits it over internet. This allows authorities to monitor air pollution in different areas and take some action to control the issue. It can be accessed through a centralized monitor with large memory. In this IoT based design, the system is capable of collecting statistic of different gases in the atmosphere. Main motive of this project is to prevent the harmful effects of pollutant's present in air so that healthy surroundings can be maintained by data analysis of stored data in IoT cloud. When IoT is augmented with sensors and actuators the technology becomes an instance of the more general class of cyber – physical systems. Which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is unique identifiable through its embedded computing system but is able to interoperate within the existing internet infrastructure. The devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. This project would also work in taking care of home and atmosphere as we could monitor the parameters from anywhere under wi-fi access.

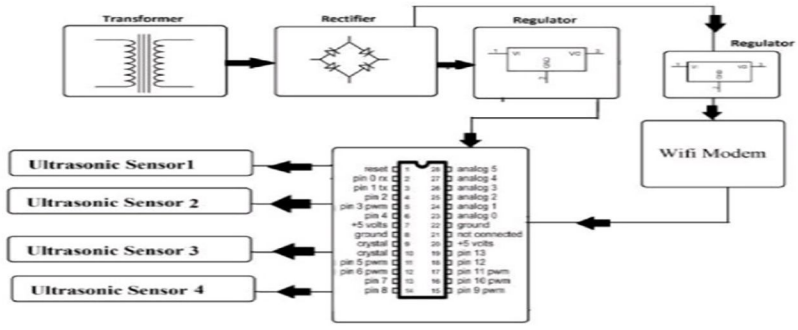

Fig I.1 : Block diagram of the project

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II. COMPONENTS OVERVIEW

Previously the air pollution monitoring is done via computerized tomography technique. Nowadays, a number of sensors can be used to monitor air pollution. In view of the daily chores of a household the monitoring of real time parameters is highly beneficial. The parameters we are dealing here are different gases, dust, room temperatures and humidity present required for an ambient living.

A. Atmega 32

This is one of the main component of this project. It offers 23 i/o pins and a 16mhz crystal oscillator is used to provide timing / clock reference

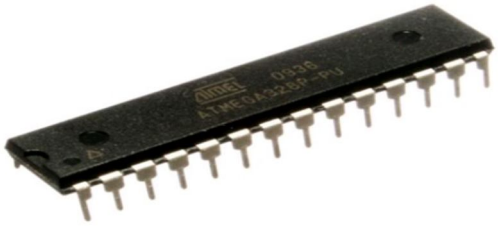

Fig II.1 : Atmega 32

B. Regulator

Voltage regulator IC's are the IC's that are used to regulate voltage. IC 7805 is a 5v voltage regulator that restricts the voltage output to 5v and draws 5v regulated power supply.

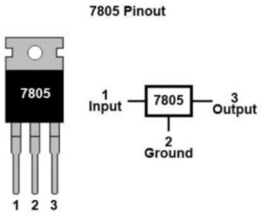

Fig II.2 : Regulator

C. Arduino UNO

ARDUINO is an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for it. It has 14 digital input / output pins, 6 analog inputs, a 16 mhz ceramic resonator, a USB connection on, a power jack, an ICSP header and a reset button.

Fig II.3 : Arduino

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D. ESP8266 Module

The ESP8266 wi-fi module is a self-contained soc with integrated TCP/IP protocol stack that can give any microcontroller access to your wi-fi network. The ESP8266 module is not capable of 5-3v logic shifting and will require an external logic level converter. This small module allows microcontrollers to connect to a wi-fi network and make simple TCP / IP Connections.

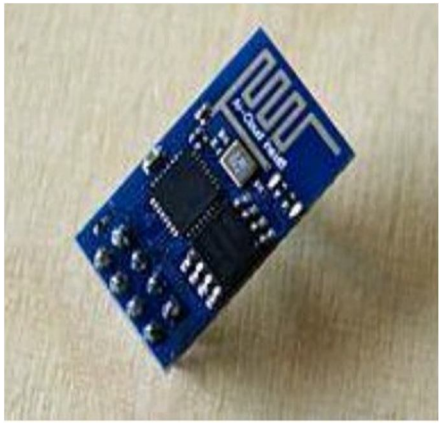

Fig II.4 : ESP8266

E. MQ-2

Gas sensors are very important part smell like a nose, gas sensors spontaneously react to the gas present, when a gas interacts with this sensor, it is first ionized into its constituents and is then absorbed by the sensing element.

Fig. II.5 : MQ-2 Sensors

F. DHT 11

Measurement and control of temperature and relative humidity finds applications in numerous areas. The DHT11 sensor comes in a single row 4 pin package and operates from 3.5 to 5.5v power supply. It can measure temperature from 0-50^{0}C with an accuracy of ±2^{0}C and reactive humidity ranging from 20-95% with an accuracy of ±5%.

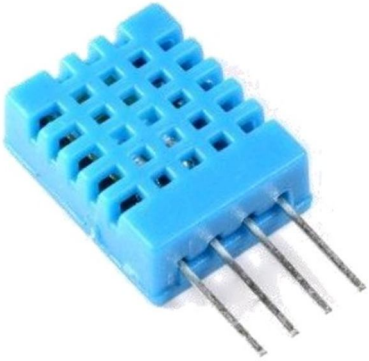

Fig. II.6 : DHT-11 Sensor

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G. MQ-7

This is simple to use carbon monoxide (CO) Sensor, suitable for sensing co concentrations in the air. The MQ-7 can detect co-gas concentrations anywhere from 20 to 2000 ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple.

Fig. II.7 : MQ-7 Sensor

H. MQ-135

Air quality sensor is for detecting a wide range of gases, including NH3, NOX, alcohol, benzene, smoke and CO_2. The MQ-15 gas sensor senses the gases like CO2, ammonia nitrogen, oxygen, alcohols, aromatic compounds, surfide and smoke.

Fig. II.8 : MQ-135 Sensor

III. LITERATURE SURVEY

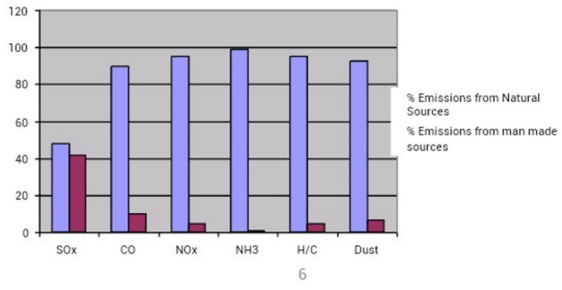

Fig. III.1 Global Emissions from natural and man-made sources.

Compared to natural sources, man's activities produce a much smaller amount of global pollution. Any substantial change in the nature or contents of the atmosphere has a direct consequence on how well the atmosphere performs these tasks. Atmospheric problems are made worse by weather conditions, so, we should know about it correctly.

IV. IMPLEMENTATION AND TESTING

More than a concept internet of things is essentially an architectural framework which allows integration and data exchange between the physical world and computer system over existing network infrastructure.

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A. Flowchart of the Project Working

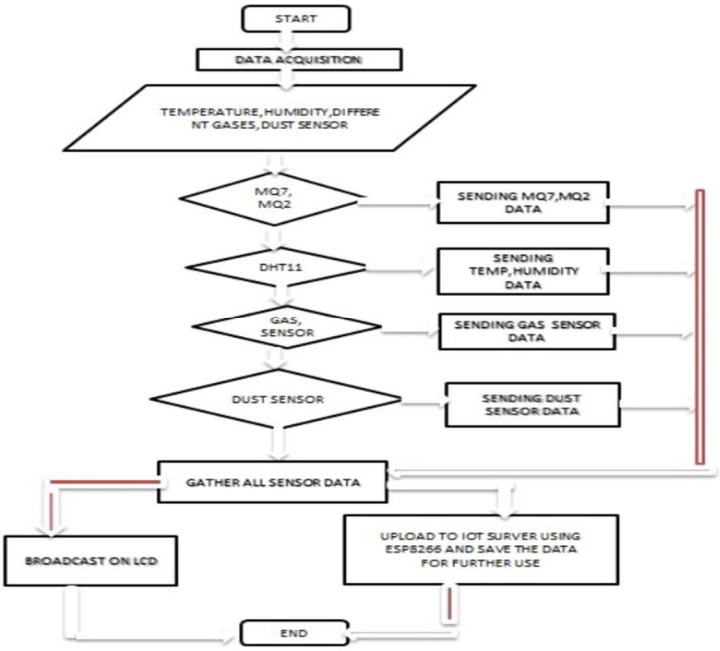

Fig. IV.1 flowchart of the working of the project

With the start of the working, Data acquisition is done which includes temperature, humidity, different gases, dust sensor. In the next step, MQ7, MQ2 sensors are used which sends MQ7, MQ2 data, then, DHT14 and Gas sensor are used which sends the Temp, Humidity and gas sensor data and finally dust sensor is used to send dust sensor data. Than, all the sensor of data are gathered and broad cast on LCD and with the results of the data, all the gathered data is uploaded to IOT server using ESP8266 and save the data for further use.

B. Flowchart for IoT Setup

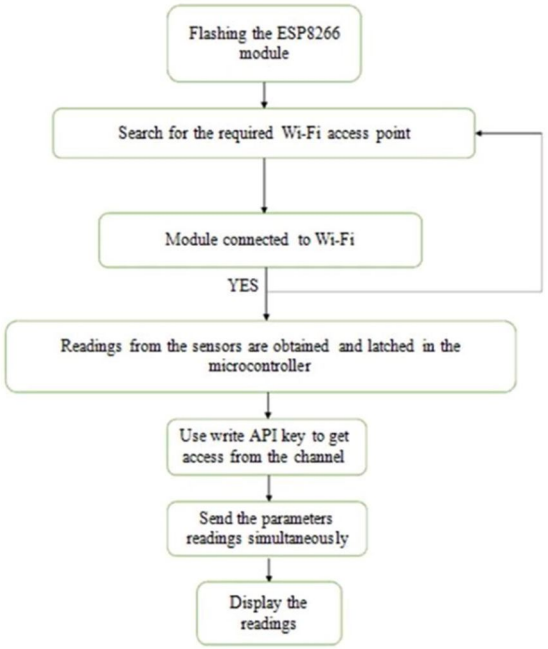

Fig IV.2 : Flowchart for the setup of IoT

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Initially, we flash the memory of the wi-fi module (ESP8266) to avoid any garbage values in our readings, then moving on to the next step we use some AT commands to set the module in the wi-fi mode and search for the available access points and then connect to any of them. If the module gets connected, it is well and good otherwise go back to the basic AT commands then retry to connect which connects our microcontroller to the wi-fi. Then the next step is for taking input C from the respective sensors in the micro controller, now after obtaining values from the sensors, we need to convert the 5 volt logic of Arduino to the 3.3 volt logic as the wi-fi module work in 3.3 volt logic, after doing that use the channel API key to transmit the data/input from the sensor to the channel and display them graphically on the space provided by the channel.

C. Circuit Diagram

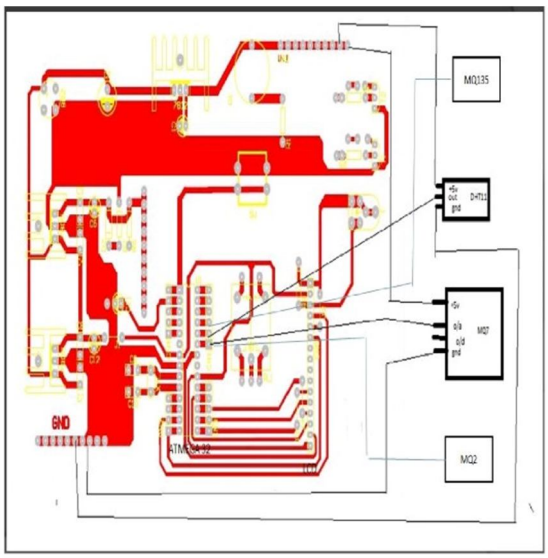

Fig IV.3 : Circuit diagram

V. APPLICATIONS

A. Roadside pollution monitoring.
B. Industrial perimeter monitoring.
C. To make this data available to the common man.
D. Indoor Air quality monitoring.
E. Site section for reference monitoring stations.

VI. ADVANTAGES

A. Detecting a wide range of gases, including CO, MH4, alcohol, smoke etc.
B. Continuous update of change in percentage of quality.
C. Sensors have long life & less cost.
D. Quality of air can be checked indoor as well as outdoor.

VII. FUTURE SCOPE OF THE PROJECT

We aim at establishing a relation between a healthy environment and healthy body. Our project will be providing real-time readings using various sensors and prepare an appropriate database of the environment of the project for months. We aim at making our project and easy to use, compiling it into a permanent portable setup. We will be developing an system which will provide real time values from the sensor and in case of any sudden change of the values, the concerned authorities would be notified and alarmed.

VIII. CONCLUSION

Urban air pollution monitoring at high granularity is highly in feasible due to high costs. We have proposed a cost effective method of measuring air pollution constituents at dense granularity in an urban setting. We have shown that we can calibrate low cost

electrochemical sensors with expensive chemical sensors to produce near accurate environmental pollution readings.

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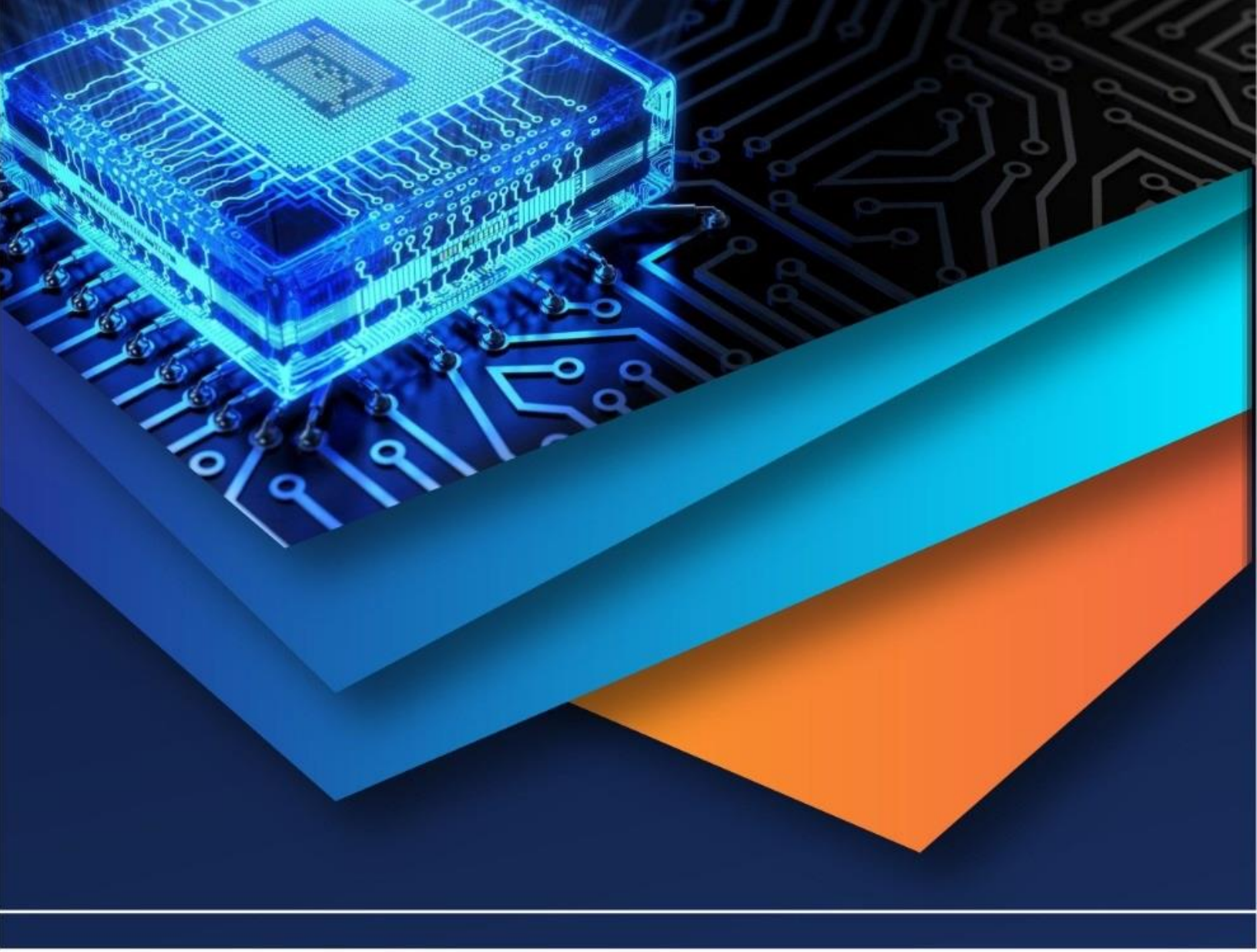

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