Air Pollution Monitoring System using MQ Sensors

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Abstract

Today in modern world pollution increases enormously as it leads to diseases like heart and lungs failure, skin cancer, diabetics etc and its leads to death in small ages. Air pollution is the major pollution which was caused by pollutant like carbon monoxide, sulphur dioxide, nitrogen oxides, ozone, particulate matter. Mainly cities are affected by air pollution than the rural areas. Implementing to detect air pollution using cost efficient sensor are easy. Sensor has become one of the emerging technology which sense data from the environment. Arduino Microcontroller to program and analyse the data. Sensor are placed in different environment where different harmful emission like vehicular emission (SO2), sewage gas (CH4, H2S), industry emission (CO2, CH4) are present hence in particular area which emission is harmful can be identified. Hence air pollution is continuously monitored and require measures can be taken for the environment to be in safety level for living beings. Main advantage of this is that it is cost efficient, less consumption of power, eco-friendly, stability and accuracy.

Keywords; *Arduino, Air pollution, industry emission, vehicular*

I. INTRODUCTION

Air is major elements among water, earth, fire. Air is a mixture of many gases like nitrogen 76%, oxygen 21% and other gases contribute remaining percentage of Earth's atmosphere. Air is invisible and has no colour. Air creates the atmosphere pressure in the Earth. Due to evolution of monkey, humans were born. Human being is the only organisms have six sense like smell, seeing, hear, touch, taste and extra sensory perception. Though we have six sense we are the most dangerous animal in the world. We are creating pollution around the world. In that one of the most dangerous pollution is form the air is the air pollution. There are certain gases which causes air pollution like methane (Ch4), carbon monoxide (CO), nitrogen di oxide (NO2) and some other gases. They are produced by human created machine. For example vehicle produce carbon monoxide, sewage produce methane, industries produce nitrogen di oxide and sulphur di

oxide which are the most dangerous gases in the atmosphere.used to detect the gases, detection method and conversion of voltage level to ppm of the sensor and remedial measures of pollution gases and analysing the data and representing the data for the public about the pollution status in and around the area.

II. MATERIALS AND METHODS

I:Arduino:

Arduino UNO is also called as Microcontroller board which is based on its particular type. It has 20 inputs or output pins, 6 analog inputs, 16MHz ceramic resonator, USB connection, power jag, ICSP header and a rest button. All these make a simple combination and provides the support the microcontroller. Terminally it is connected with the computer by using USB cable and it is charged by AC or DC battery. UNO is different from all available boards and it is programmed by USB to

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serial converter. It is an open source software which act as bridge between hardware and software. It has several feature like it is an open source, cross platform, extensible and inexpensive software. In this project Arduino is like the motherboard of the computer.

Fig 1: Arduino Board

II:LCD DISPLAY:

Fluid precious stone showcase screen meets expectations on the standard of blocking light as opposed emitting those light. LCD's obliges backlight also they don't emits light by them. Cathode beam tube draws a greater amount energy contrasted with LCD's Furthermore would also it's heavier Also greater. Even screen LCD What's more plasma screens which partake) energizes An totally distinctive approach. Clinched alongside A plasma screen, each pixel may be A small fluorescent light may be switched once or off electronically. In an LCD television, those pixels need aid switched ahead alternately off electronically utilizing the fluid crystals on turn polarized light. I2C LCD uses less number of pins. It uses four pin ground, voltage, SDA and SCL. SDA is used for data transfer and SCL is used for synchronous clock pulses.

Fig 2: I2c 16*2 LCD Display

III:MQ2 SENSOR:

MQ2 is an electronic sensor made up of metal oxide semiconductor which is also called as chemiresistor. This sensor is used to detect several gases like LPG, methane, alcohol, smoke and carbon monoxide etc. This works on the principle of voltage divider network. It has an sensing resistance in which change in resistance is used to get the value from the sensor. It works on the 5V voltage which measure the concentration range up to 100 to 10000ppm. It has sensing element tin oxide coated with aluminium oxide. It has six leads out of these four leads are used for the output signals and two are used for heating the sensor. First the sensor is placed in fresh air therefore oxygen gets absorbed on the surface of tin oxide so that there will be no current flow between the leads. After that the sensor is placed in the polluted area so that oxygen gets absorbed by the reducing gases and current flow is achieved in the sensor and the sensor produce the output value.

Fig 3:MQ2 Sensor

IV:MQ131 SENSOR:

MQ131 sensor is used to detect ozone and nitrogen di oxide. This sensor is similar to MQ2 sensor. This sensor has aluminium oxide with ceramic coated with tin oxide which acts as a sensing element. This sensor can measure range up to 10ppm to 5ppb. Ozone, NO2 and CL2 are the gases affinity to the ozone sensor. First this sensor is placed in fresh air so that oxygen gets absorbed on tin oxide so therefore there will be no current flow in the sensor. Then the sensor is place in the highly polluted area then the reducing gases which are affinity to oxygen gets absorbed and the current flow is achieved in the sensor so voltage is measured from the sensor. It has six leads out of these four are used for output signals and two are used for heating the sensor. By heating we can get more accurate value.


**Fig 4:MQ131 Sensor**

III.   WORKING

MQ sensors, LED, LCD display and Arduino are interfaced together as per the circuit diagram. First the MQ sensor are placed in fresh air so that sensor absorb fresh air (oxygen), so that in the sensor there will be nocurrent flow. Meanwhile the sensor is preheated for 24 hours so that sensor can get more accurate value. After that sensor are placed in the selected region where the area has been polluted. Sensors which act as actuators sense the gases from the environment and the change in resistance in the sensor gives the voltage value of the sensor. Then the sensor value is send to the Arduino controller which process the data. Then using Arduino program there is a conversion from measured value(voltage) to ppm value. After that using ppm

value, value are analysed and if the value is greater than threshold value(different gas normal value to human) then the LCD and LED are used to view the result gaseous value in that polluted area. LCD is used to display the PPM value of different gases. Further the ppm value can be sent to a web page so that the area pollution can be monitored using node MCU.
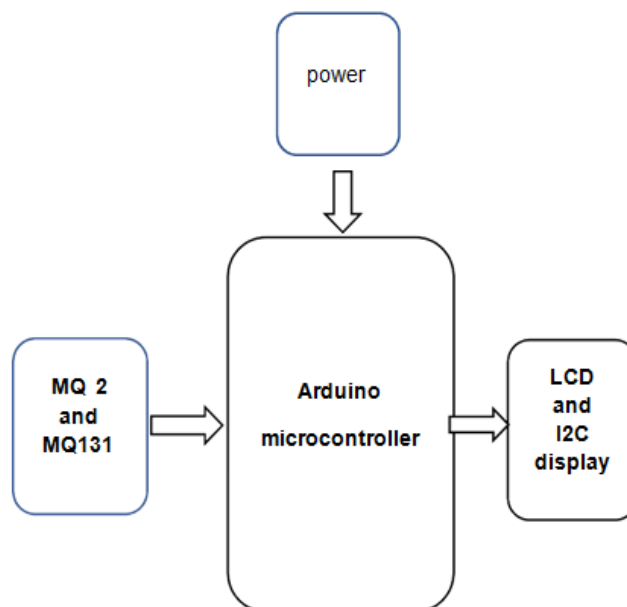
cheapest and easy way is this project. Maintain the pollution is difficult but we need to monitor the pollution to live safely and happily.

IV.   BLOCK DIAGRAM
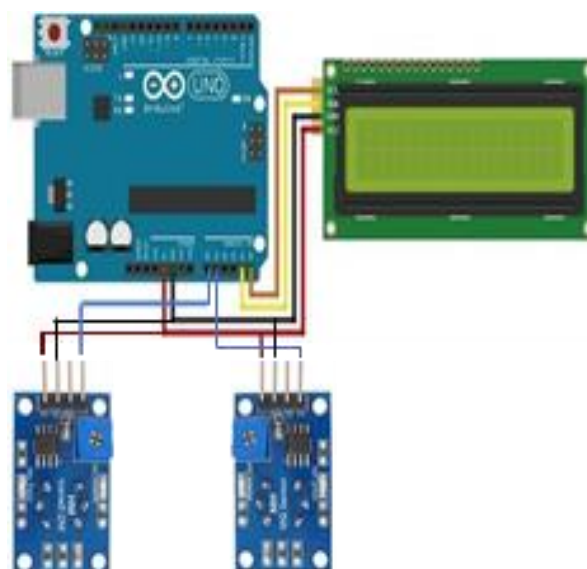
OUTPUT:

V. RESULT AND ANALYSIS

The value which we get from the sensor are displayed on the I2C LCD screen and LED are ON when the sensor ppm value increases above the threshold value. The result areanalysed using Arduino controller and the output from the controller are given to LCD and LED. Threshold value of different gases are taken according to the world health organisation. Further the value are updated in the web page using WIFI module so that remedial measure of that pollution can be taken according to that value.

VI.   CONCLUSION

Though we get value from the sensor and has taken remedial measure from the sensor. We are the people who has to take responsibility of maintaining the fresh air in the environment. Air pollution cannot be controlled but at least remedial measures can be taken to control or monitor the pollution. There are many ways to monitor the air pollution one of the cheapest and easy way is this project. Maintain the pollution is difficult but we need to monitor the pollution to live safely and happily.

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