

IOT BASED AIR POLLUTION MONITOR SYSTEM FINAL PHASE

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INTRODUCTION

- Air pollution is the biggest problem of every nation, whether it is developed or developing. .
- According to a survey, due to air pollution 50,000 to 1,00,000 premature deaths per year occur in the US alone whereas in EU number reaches to 3,00,000 and over 30,00,000 worldwide.
- The design of buildings for lower power consumption resulted in decrease of ventilation which further decreases the quality of air inside the building.
- This increases the need for indoor air quality (IAQ) monitoring due to this fact and use of new building materials, IAQ often reaches to unacceptable levels.

LITERATURE AND SURVEY

Author name	Journal/Paper name	Technique used	Work Focused
Navreetinder Kaur, Rita Mahajan and Deepak Bagai	Air quality monitoring system based on arduino microcontroller	Digital signal acquisition technique	Air quality monitoring
Dr. Xirong Li	Applications of wireless sensors in monitoring Indoor Air Quality in the classroom environment	Stagnant monitoring technique	To investigate indoor air quality monitoring technologies, government regulations and policies, and best practices to improve IAQ while minimizing the adverse effect of poor IAQ in classroom environment
Vikhyat chaudhry	Arduair: Air Quality Monitoring	Conventional Carbon monoxide measurement technique	Air quality monitoring

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Anjaiah Guthi	Implementation of an Efficient Noise and Air Pollution Monitoring System Using Internet of Things(IOT)	Monitoring the pollution parameters in a particular area of interest	Controlling and monitoring of different activities
Qasem Abu Al-Haija	Monitoring of AIR quality in King Faisal University using a microcontroller and WSN	Electrical Engineering technique	Focused mainly on measuring two main gases: Carbon monoxide (CO) and Liquid Petroleum Gas (LPG)

STATEMENT ABOUT PROBLEM

- During past decades, as a result of civilization and urbanization there is a huge growth in polluting industries.
- To monitor the quality of air, a new framework is proposed that monitors the parameters of the environment around us such as CO₂, CO, presence of smoke, alcohol and LPG with help of Wi-Fi module and gas sensor.

OBJECTIVE AND SCOPE

- To preserve and improve the quality of our nation's air. If the quantity of air pollution increases, it can prove harmful to the humans.
- A network of IOT is used to connect the internet and access it globally.
- IOT typically utilize sensors to assist in environmental protection by monitoring air.

BLOCK DIAGRAM

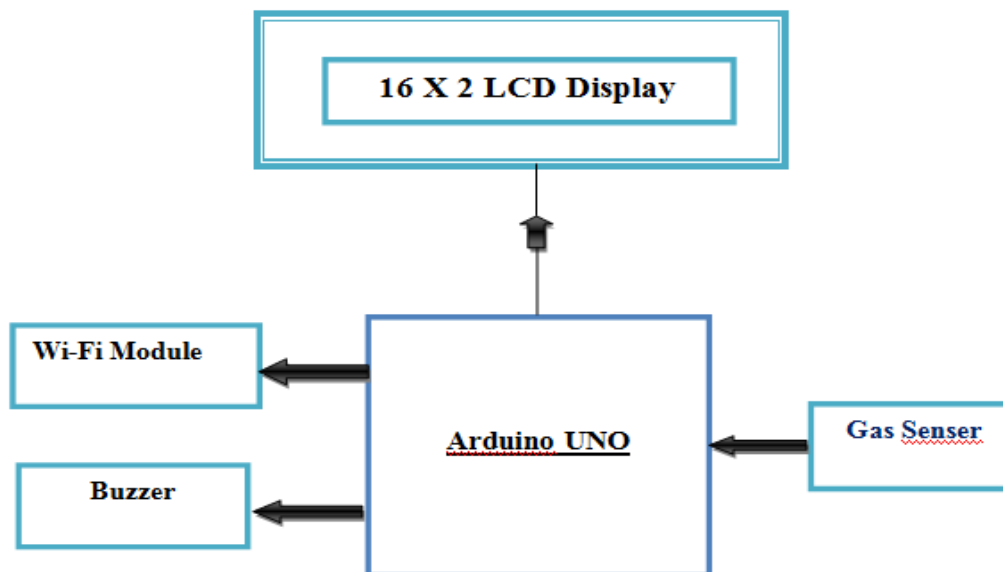
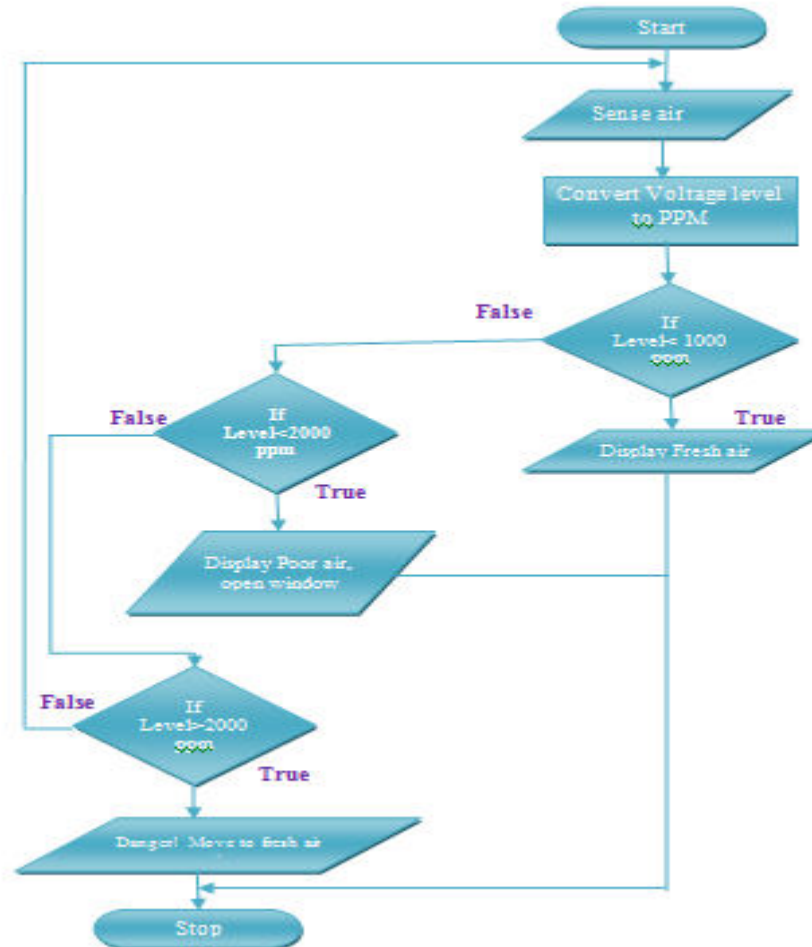


Fig 1 Block diagram

METHODOLOGY

- The MQ135 sensor can sense NH₃, NO₂, alcohol, Benzene, smoke, CO₂ and some other gases, so it is perfect gas sensor for our **Air Quality Monitoring Project**.
- Sense the gases, and we will get the Pollution level in PPM (parts per million).
- When the value will be less than 1000 PPM, then the LCD and webpage will display “Fresh Air”.
- Whenever the value will increase 1000 PPM, then the buzzer will start beeping and the LCD and webpage will display “Poor Air, Open Windows”.
- If it will increase 2000 PPM then the buzzer will keep beeping and the LCD and webpage will display “Danger! Move to fresh Air”.

FLOW CHART



REQUIREMENTS

HARDWARE REQUIREMENT

- MQ135 Gas sensor
- Arduino Uno
- Wi-Fi module ESP8266
- 16X2 LCD
- Breadboard
- 10K potentiometer
- 1K ohm resistors
- 220 ohm resistor
- Buzzer

SOFTWARE REQUIREMENT

- Arduino IDE software

HARDWARE DESCRIPTION

Arduino Uno

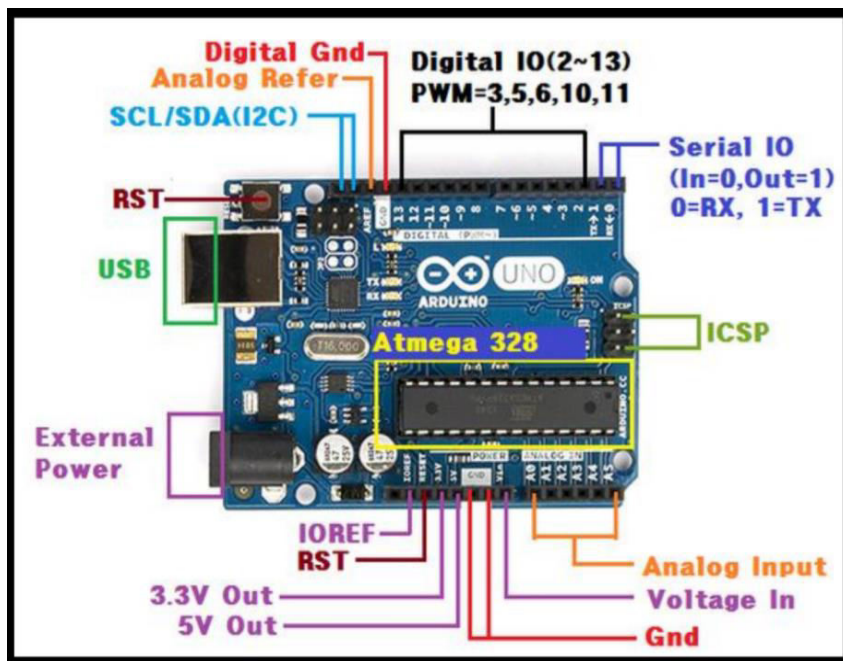


Fig 2 Arduino Uno

- Arduino uno is 8 bit microcontroller board on Atmega328.
- It has SRAM 2kb and a flash memory 32kb. EEPROM with 1kb.
- Arduino UNO is needed to connect it to a computer using a USB cable or power it with an AC-to-DC (7-12V) adapter.
- The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX).

WI FI MODULE ESP8266

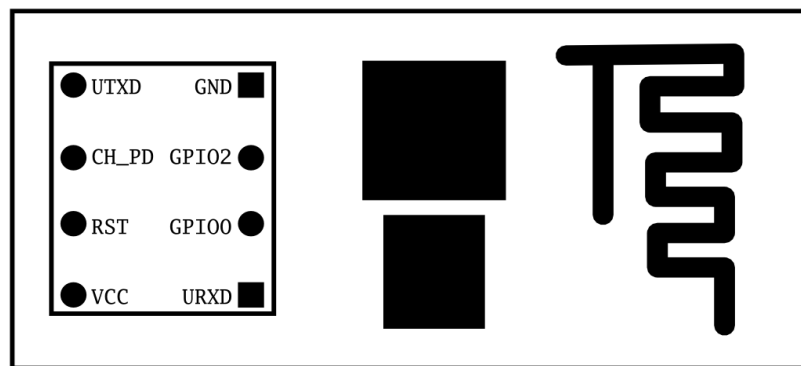


Fig 3 ESP8266

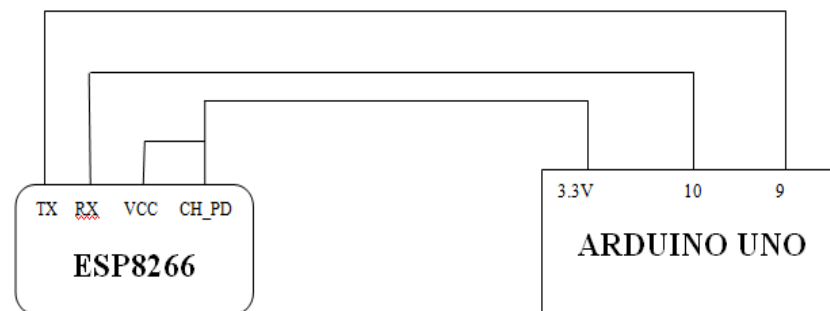


Fig4 Interfacing ESP8266 with arduino Uno

ESP8266 is a low cost Wi Fi chip with full TCP/IP stack and a Microcontroller unit . The chip embedded in an ultra-low-power 32-bit micro-CPU, with 16GPIO pins .With the help of AT commands ESP8266 can be interfaced with the Arduino Uno.

MQ 135 GAS SENSOR



Fig 5 MQ135 Gas Sensor

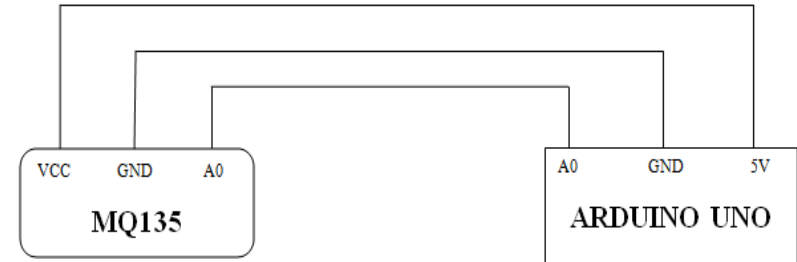


Fig 6 Interfacing MQ135 with Arduino Uno

MQ135 alcohol sensor is a SnO_2 with a lower conductivity of clean air. The MQ135 gas sensor has high sensitivity in ammonia, sulfide, benzene steam, smoke and in other harmful gas. The air quality sensor is a signal output indicator instruction. It has two outputs: analog output and TTL output

16X2 LCD

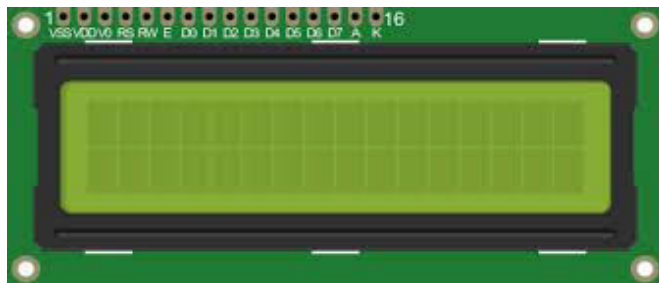


Fig 7 16X2 LCD

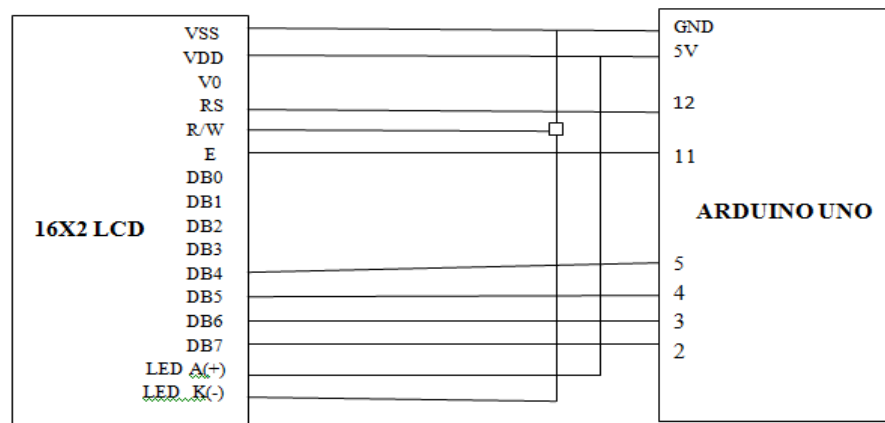
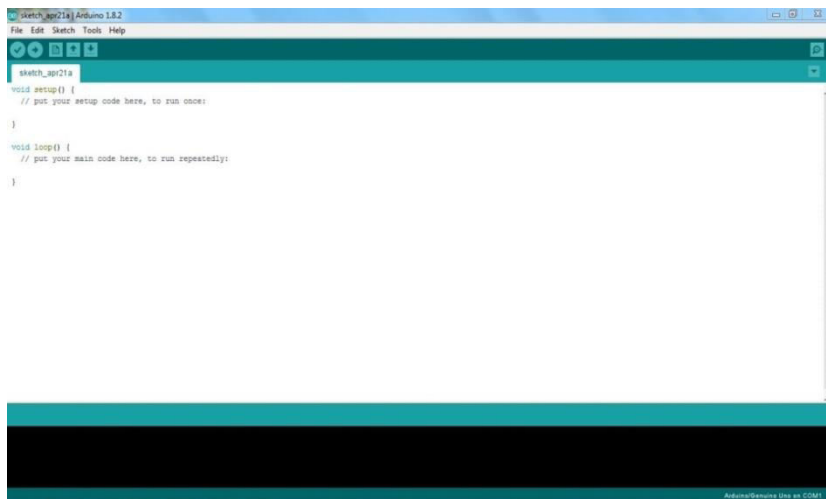


Fig 8 Interfacing LCD with Arduino Uno

A liquid crystal display (LCD) shown in Figure 8 is a flat panel display, electronic visual display, based on Liquid Crystal Technology. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines . A LCD has 16 pins which consists of 8 data bits ,back light anode and back light cathode.

SOFTWARE DESCRIPTION



- **Verify:** Checks the code for errors compiling it.
- **Upload:** Compiles your code and uploads it to the configured board.
- **New:** Creates a new sketch.
- **Open:** Presents a menu of all the sketches in your sketchbook. Clicking one will open it within the current window overwriting its content.
- **Save:** Saves the sketch.
- **Serial Monitor:** Opens the serial monitor.

Fig 9 Screenshot of Arduino IDE 1.8.2

ADVANTAGES AND LIMITATIONS

ADVANTAGES

- Easy to implement.
- Low cost.
- Assessing public health impacts caused by poor air quality.
- Determining whether an area is meeting the standards.
- Evaluating changes in air quality as a result of state implementation plans.

LIMITATIONS

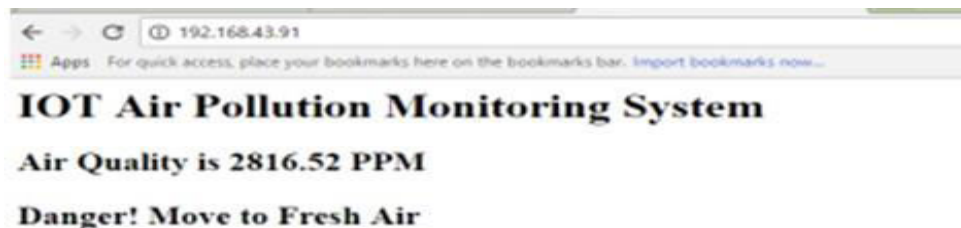
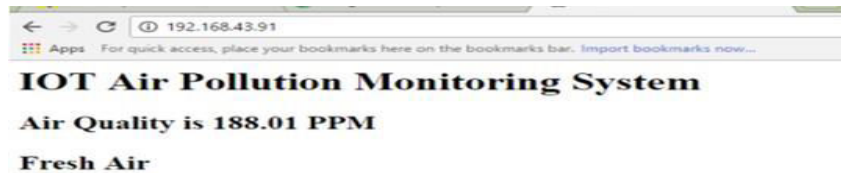
- There are limited numbers of monitors that can be sited and maintained.
- For example air monitors are not located near source of high air pollution since the goal is to obtain a picture of the ambient background levels.

APPLICATION

- Urban Air Monitoring
- Industrial Perimeter
- Roadside Monitoring
- Research & Consultancy

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RESULTS





CONCLUSION AND FUTURE WORK

- The detection and monitoring of dangerous gases is taken into account in a serious manner.
- Its estimated that this system will have a great acceptance in the market as it is a centralized system for a complete monitoring function.

FUTURE SCOPE

- Continual work still needs to be done integrating the Arduino software into the Lab View system.
- A complete wireless system with multiple nodes needs to be developed to monitor several locations.

REFERNECE

1. Dr. Xirong Li, “Applications of wireless sensors in monitoring Indoor Air Quality in the classroom environment” 2012. www.teo.unt.edu/ret/pdf/IAQ-report.pdf.
2. Vikhyat chaudhry, “Arduair: Air Quality Monitoring” 2013, www.ripublication.com/ijeem_spl/ijeemv4n6_19.pdf
3. Navreetinder Kaur, Rita Mahajan and Deepak Bagai “Air quality monitoring system based on arduino microcontroller” June 2016. https://www.ijirset.com/upload/2016/june/18_Air.pdf.

Thank you!

