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AIR POLLUTION DETECTOR SYSTEM

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Abstract:

We are living in a world where evolution is happening in every aspect of not only in one's individual life but also to the places and people around us with this growing evolution. There are some threats which where alarming us with something bad to happen. One of the major concerns among this is air pollution. The polluted air is widespread and has a very strong tendency of covering us with deeply intricate type of diseases. According to the report given by WHO ambient air pollution accounts for an estimated 4.2 million death per year. Due to stroke, heart disease, lung cancer acute and chronic respiratory diseases. Around 99% of the world's population live in a place where air quality level exceeds WHO limits. This paper proposes a small measure to monitor the air quality and to alarm the user to take corrective actions. This project ensures accuracy by accurately calculating data of various pollutants around in the air.

Index Terms: Introduction, Aim of the Project, Block Diagram, Working, Gas Sensors, Features of Gas Sensors, Features of DHT11 Temperature Sensor, Advantages, Disadvantages, Conclusion, References.

Keywords: Arduino uno, MQ2, MQ6, MQ9, MQ135, DHT11, Air Pollution Detector System.

INTRODUCTION:

Air pollution accounts for 1 in 8 deaths worldwide approximately 7 million deaths in 2012.This pie chart helps you to get a broader picture of health issues and deaths caused by air pollution.

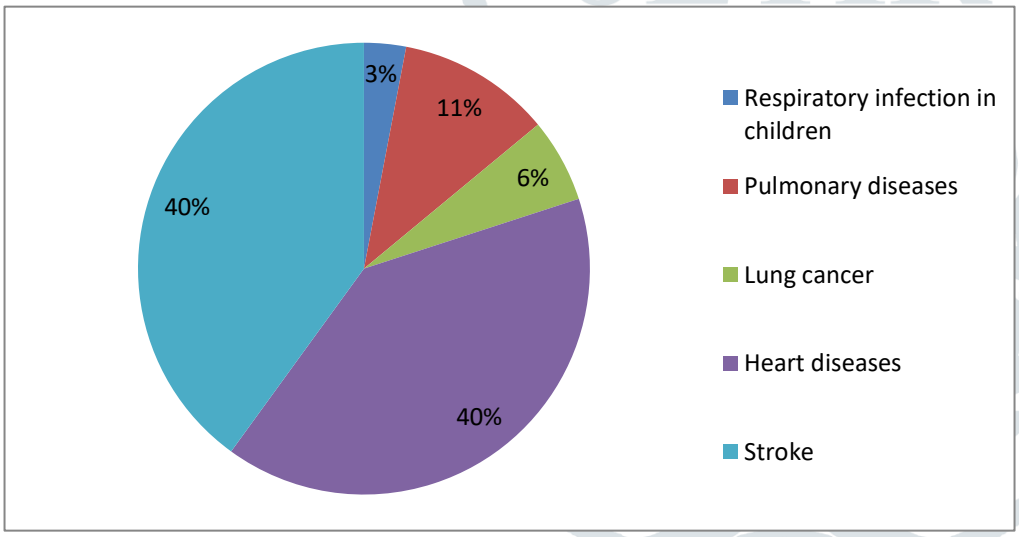


Fig 1- Pie chart representation of ambient air pollution

Considering the severity of the threats caused by air pollution every attempt has been made to ensure the accuracy of measurement of various pollutants which were included by Environmental Protection Agency (EPA) IN AQI. The EPA calculates the AQI for five major air pollutants-

1. Ground level ozone
2. Dust Particle
3. Carbon Monoxide
4. Sulphur dioxide

5. Nitrogen dioxide

An AQI (Air Quality Index) is used by government agencies to communicate to the people how polluted the air currently is or how polluted it is forecast to become.

According to the new State of Global Air Report released in October 2020. Air pollution is the world's fourth leading risk factor for earth death.

AQI	Category
0 - 50	Good
51 - 100	Satisfactory
101 - 200	Moderate
201 - 300	Poor
301 - 400	Very poor
401 - 500	Severe

Despite improvement in reducing global average mortality rates from air pollution the world's most populous countries like India and China continue to bear the highest burden of diseases.

AIM OF THE PROJECT:

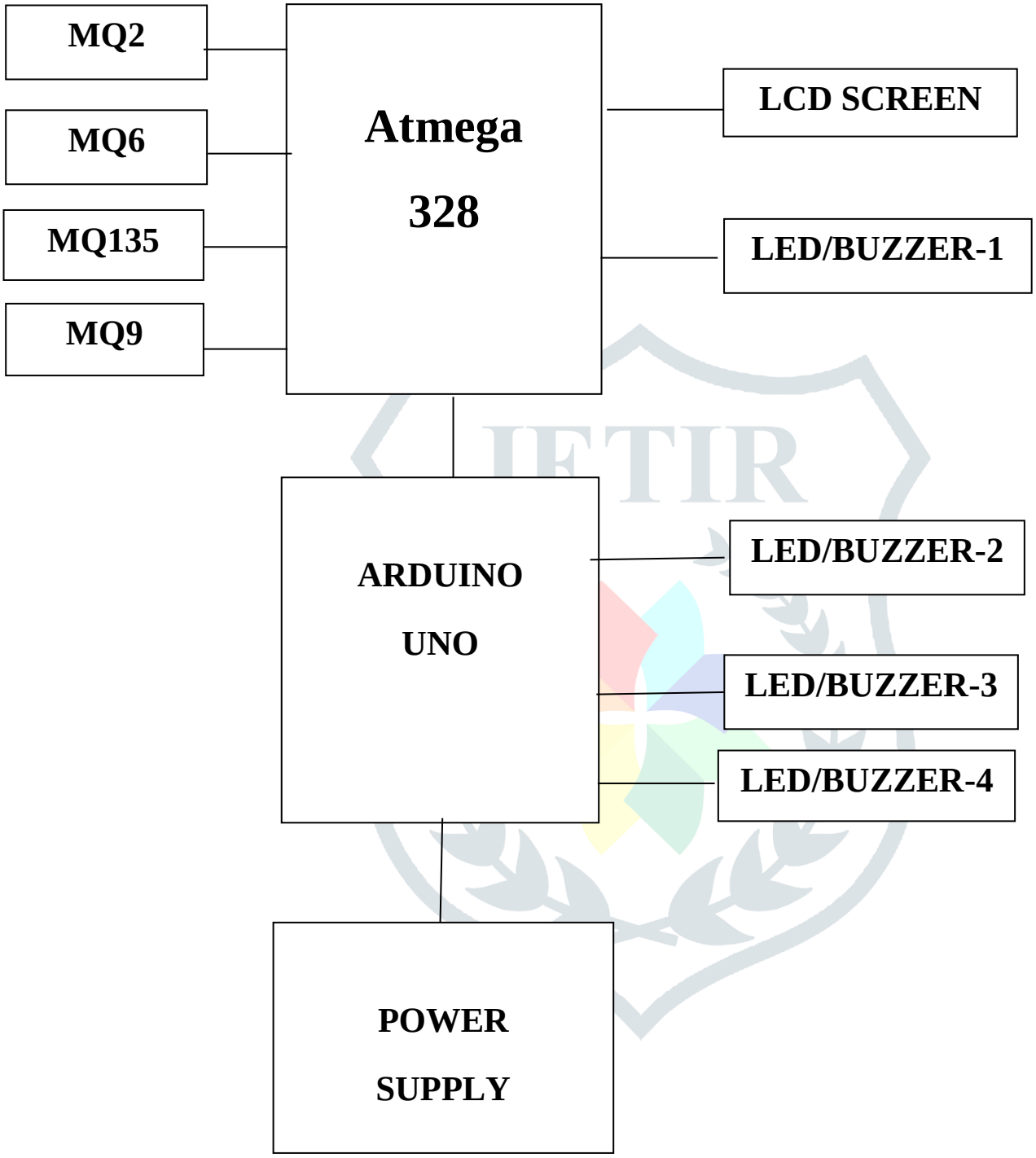
Air Pollution detector system comprises of a microcontroller and some gas sensors which senses different pollutant element in gas and provide user with accurate measurement of air quality around them. In more precise, this project is particularly intended to alert the user about air quality around them.

WORKING:

1. A reset button is provided to reset the last data recorded.

2. When power supply is turned on and after that when you press a reset button in a next couple of seconds you would see yourselves a reading of different constituent pollutants of nearby surrounding in the LCD screen.
3. When the level of air pollution exceeds the limit, the alarming buzzer alerts the user that the air surrounding them is unsafe to breathe.

BLOCK DIAGRAM:



GAS SENSORS:

MQ6 Gas sensor- This module is useful for gas leakage detection. It is suitable for detecting H_2, LPG, CH_4, CO, alcohol. This is an analog output sensor. The output voltage from gas sensor. The output voltage from gas sensor increases when concentration of gas increases. Sensitivity can be adjusted by varying through potentiometer.

MQ2 Gas sensor- This module is useful in detecting analogread and Carbon Monoxide is a metal oxide semiconductor type gas sensor also known as chemiresistor as detection based on change of resistance of sensing materials when gas comes in contact with material. Using a simple voltage divider network concentration of gases can be detected.

MQ9 Gas sensor- Module is useful for gas leakage detection usually LPG, CO, CH_4.This is an analog output sensor. The output voltage from gas sensor increases when concentration of gas increases.

MQ135 Gas sensor- MQ135 Gas Sensor can detect gases like Ammonia, Sulphur, Benzene, CO_2 and other harmful gases and smoke.

FEATURES OF GAS SENSORS:

1. Operating voltage is +5V.
2. Can be used to measure or detect LPG, alcohol, propane, hydrogen, CO and even Methane.
3. Analog Output voltage 0V to 5V.
4. Digital Output Voltage from 0V to 5V.
5. Preheat duration is 20s.
6. The sensitivity can be varied using the potentiometer.

FEATURES OF DHT11 TEMPERATURE SENSOR:

1. Ultra low cost.
2. 3 to 5V power and I/O.
3. 2.5mA max current use during conversions.
4. Good for 20% to 80% humidity, reading with 5% accuracy.
5. No more than 1Hz sampling rate.
6. 4 pins with 0.1” spacing.

ADVANTAGES:

1. Accurate detection of pollutants.
2. The availability of buzzer makes it more advantageous in reporting the quality of air around.
3. Affordable and not very expensive.
4. Small and compact size.

DISADVANTAGES:

1. Large number of sensors make the circuit bulkier.
2. Chances of error increases in prediction as number of component used here is high.
3. Real time analysis is not possible as project does not involve IOT applications.

CONCLUSION:

1. This project is a light weight and lost efficient method to provide user with a brief knowledge about air quality around them.
2. With the use of various accurate sensors the monitoring of various pollutants is easily done here.
3. The project could be more enhanced by adding functionality of IOT.
4. If possibly other methods or functions to not only detect but also to clean the surroundings is added, this would make this project a masterpiece in itself.

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