AIR POLLUTION MONITORING AND CONTROLLING USING IOT

Introduction:

The main objective of the IoT Air pollution Monitoring and controlling System is that Air pollution has been a primary concern in recent years. It is critical to control and control air quality for a brighter future and a healthy life for all of us. Because of its adaptability andlow cost,the Internet Of Things (IoT) has become increasingly popular. With the growth of cities and the number of drivers on the road, the atmospheric conditions have been considerably affected. Harmful effects of the pollution include mild reactions which can be irritation of the throat, eyes and nose as well as some majority problems like bronchitis, lung,heart diseases, pneumonia and aggravated asthma. Monitoring gives measurements of air pollution and sound pollution concentrations be analyzed, interpreted and presented. These information can then be applicable in multiple ways Analyzing of monitoring data allows us to assess how bad air pollution and sound polluting nowadays. Air pollution is the big problem of every nation, whether it is developed or developing. Health problems have be growing faster, especially in urban areas of developing countries where industrialization row increasing of vehicles leads to the lease of a lot of gaseous pollutants. Harmful effects of the pollution mayinclude mild allergic reactions such as irritation of the throat, eyes and nose and these may causing heavy problems like bronchitis, heart diseases, and aggravated asthma etc. According to a survey, 50,000 to 100,000 pr premature deaths per year occur in the U.S. alone due to air pollution. IOT based air pollution monitoring system gets monitored these Air quality over a web server with the help of internet resources which may alarm and go down beyond a certain threshold level, which means when there are sufficientamountof hazardous gases present in the air such as Carbon dioxide , smoke, NH3, LPG and NOx. It shows the air quality in Parts per millionwith display and on the web page to monitor it very quickly.

Ways to control air pollution

-Reduce the number of trips you take in your car. -Reduce or eliminate fireplace and wood stove use. -Avoid burning leaves, trash, and other materials. -Avoid using gas-powered lawn and garden equipment.

4W's & 1H

what

It is a project about montioring the hazardous gases.

where

Parking areas and pollutated environments.

when

Whenever the normal environments becomes more hazardous.

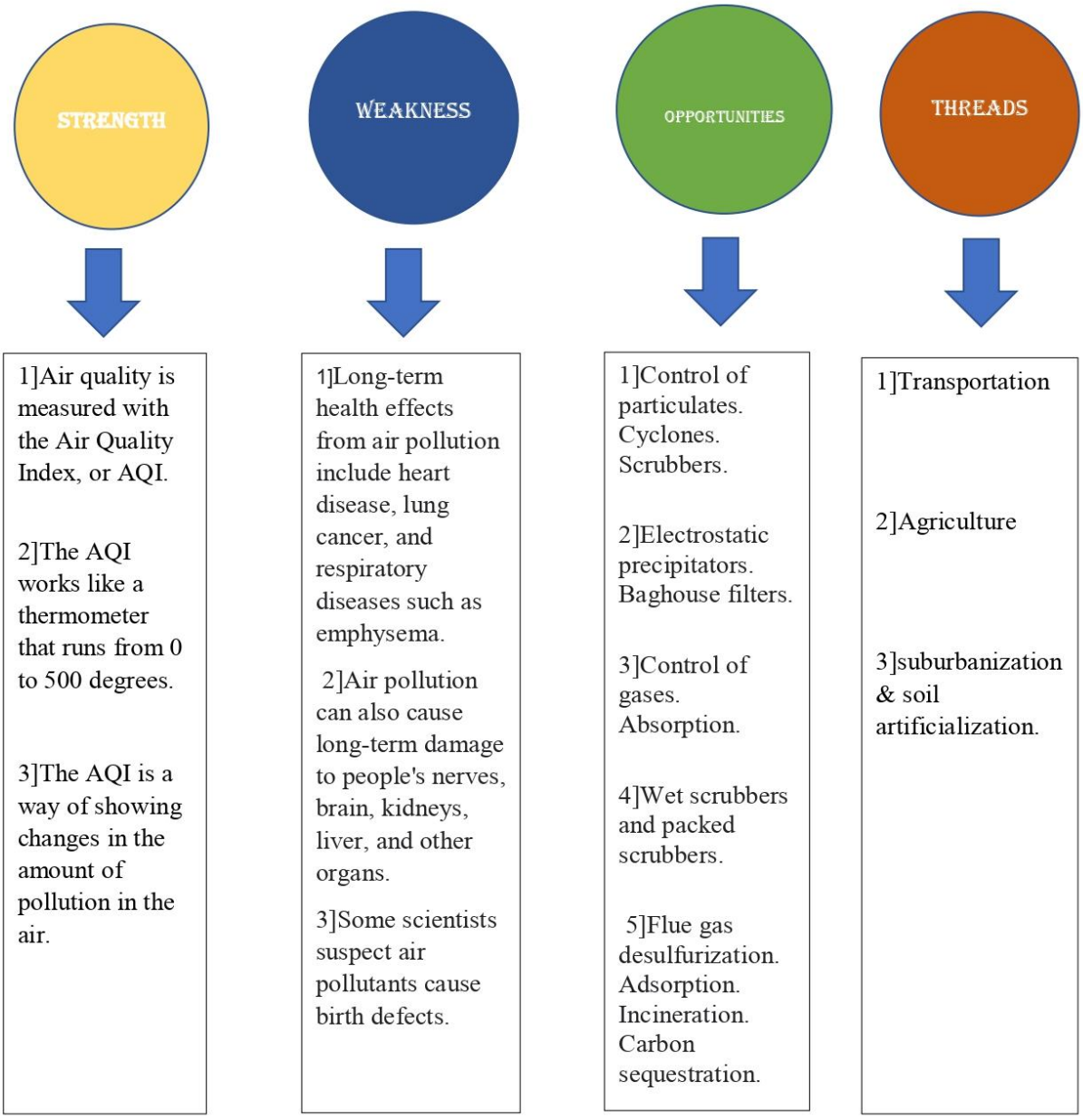
who

An industrail organizations or an public reformers.

How

The project will be entertained once hazardous gases involves.

SWOT ANALYSIS



Requirements

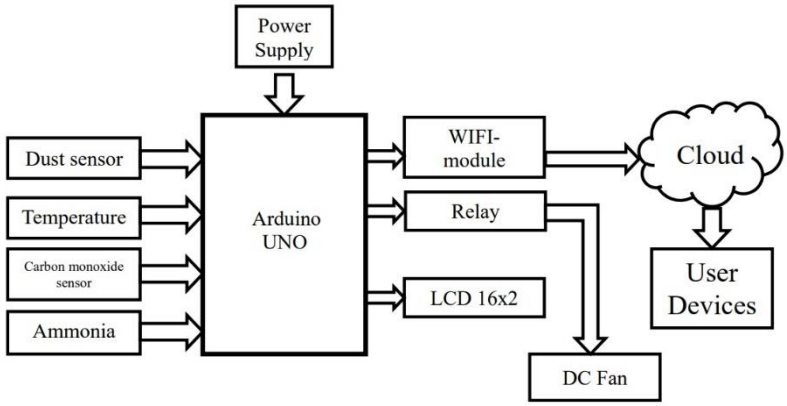
High Level Requirements:

RID	DESCRIPTION
HLR1	Pollutant air monitoring
HLR2	MQ135-Detect ammonia gas
HLR3	MQ7-Detect carbon monoxide
HLR4	Dust sensor-Detects unwanted particles in air
HLR5	DC fan-It can suckout the pollutated air

Low Level Requirements:

RID	DESCRIPTION
LLR1	Monitoring process
LLR2	gas detector sensor
LLR3	gas detector sensors
LLR4	gas detector sensors
LLR5	Remove the pollutated air

Block diagram:



Block Diagram Components specifications:

The components provide a particular function or group of related functions.The ingredients used in this project are Arduino UNO, LCD, MQ7, MQ135, DustSensor and DC fan. The specifications of parts are discussed.

FEATURES OF BLOCK DIAGRAM COMPONENTS:

1] ARDUINO UNO:

Arduino Uno anmicrocontroller boarded sheet based on an 8-bit ATmega328P microcontroller. Additionally to the ATmega328P microcontroller, other components such as a crystal oscillator, serial communication, voltage regulator, etc. are included. The Arduino Uno has 14 digital I/O pins (out of which six are used for PWM outputs), and nine analog I/O pinssixanalogue input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

2] LIQUID CRYSTAL DISPLAY:

In an LCD television, the pixels are switched on or off electronically using liquid crystals to rotate polarized light LCDs are used in a wide range of applications, including LCD televisions, computer monitors ,instrument panels, aircraft cock pit displays, and indoor and outdoor signage .LCDs (Liquid Crystal Displays) are used in embedded system applications to display various system parameters and statuses.LCD 16x2 is a 16-pin device of 2 rows that can accommodate 16 characters each. LCD16x2 can be used in 4-bit modern 8-bitmode.It is also possible tolerate custom characters. It has 8data lines and 3control lines that can be used for control purposes.

3] TEMPERATURE SENSOR:

Maxim integrated's DS18B20 is a 1-wire programmable Temperature sensor. It is commonly used to detect temperature in difficult conditions such as chemical solutions, mines, and soil. The sensor's

constriction is unequal, and it's also available with a waterproof option, making the growing process simple. It can measure a wide range of temperatures, from -55°C to +125°C, with a 5°C precision. Because each sensor has its own address and only uses one MCU pin to transport data, it's an excellent choice for measuring temperature at many locations without sacrificing too many of your microcontroller's digital pins.

4] DUST SENSORS:

Measurement of air quality is becoming more and more necessary in big cities due to air pollution and health problems it causes. There are many sensors on the market which can measure air quality, and recently, the very latest sensors get into the concern which have been developed.,GP2Y1010AU0F from Sharp is a small optical dust sensor that can detect dust and smoke particles. It consumes very little power while operating, which makes it ideal for an always-on monitoring system.

5] MQ-7 SENSOR:

- High sensitivity to carbon monoxide
- Stable and long life

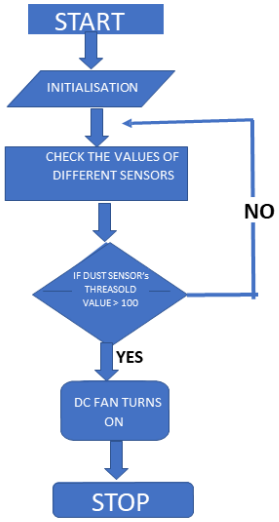
6] MQ-135:

- Wide detecting scope
- Fast response and High sensitivity
- Stable and long life
- Operating Voltage is +5V
- Detect/Measure NH3, NOx, alcohol, Benzene, smoke, CO2, etc.
- *nalog output voltage: 0V to 5V
- Digital output voltage: 0V or 5V (TTL Logic)
- Preheat duration 20 seconds
- Can be used as a Digital or analog sensor
- The Sensitivity of Digital pin can be varied using the potentiometer

7] DC FAN:

This fan is used to suckout the harmful air.

FLOW CHART:



Applications of IoT based Air Quality Monitoring:

1) Indoor Air Quality Monitoring System:

It is quite shocking to know that more than 3.8 million people die annually due to indoor air pollution. The presence of particulate matter and harmful gases drops the quality of air, which when inhaled can cause severe diseases such as asthma, decreased lung function, and even cancer.

While the data pertains to both industrial as well as the commercial segment, the impact of air pollutants on workers is more due to the increased concentration of contaminants. The indoor air quality monitoring system thus helps companies to build a healthier working environment to keep the AQI under control. By comparing the real-time air quality data with ideal conditions, companies can facilitate adequate ventilation, control the production of pollutants in their facility, and keep temperature & humidity level in a comfortable range.

2) Outdoor Air Quality Monitoring System:

Environmental health has been a topic of discussion for decades. Different policies and regulations pertaining to the emission of pollutants in the air have been imposed to keep the air quality high. Hence, to keep the emission rate well under control as per the determined guidelines, it is important for industries to monitor the production of harmful gases.

By using outdoor air quality monitoring systems, companies can track the air quality index around their manufacturing units and subsequently control their emission rates. This helps them to adhere to regulations and prevent any lawfully enforced consequences from air quality administering organizations when air pollution levels exceed its limits.

3) Particulate Matter Monitoring:

Particulate matter (PM) or Particulates are solid or liquid microscopic particles suspended in the air. Also known as aerosols, these particles are invisible to the naked eye and can be made up of different components like acids, metals, soil, dust, organic chemicals, etc.

Since these particles are very small, they can be easily inhaled and affect health. The severity of the health issues is directly related to the size of these particles. Coarse PM that is generally found near highways or dusty industries ranges between 2.5 and 10 micrometers. However, the particles that are smaller than 2.5 micrometers are more dangerous since they can easily pass through the nose and throat and enter the lungs.

Controlling the creation of these particles during manufacturing or any other process is hence very important in industries since their continuous exposure can affect the health and performance of workers. By using a PM monitoring sensor along with air quality monitoring systems, companies can monitor the amount of particulate matter present in their facility. The sensor has a laser that scatters whenever particulates cross it. Based on the scattering of laser, the amount of PM in the air can be estimated.

Hence, companies can take steps to reduce the concentration of aerosols in their facility and create a healthy working environment for their employees.

4) Gas Detection System:

In industries like chemical and oil & gas, where harmful gases and toxins are either used or produced in or during manufacturing processes respectively, even a minor leakage can result in a catastrophe.

Working under the presence of H_2S or SO_2 for long durations can affect the respiratory system of the workers. Prolonged exposure can even affect mental health and cause severe headache, convulsions, nausea, or conjunctivitis. Also, leakage of combustible gases such as LPG or methane can result in explosions, causing injury to nearby operators and equipment damage. Moreover, oxygen displacing gases (also known as asphyxiants) such as methane or propane can reduce the concentration of oxygen level that can cause severe mental health issues and also death.

By using gas detection systems, the leakage of toxic and combustible gases can be detected and steps can be taken to roll-out the evacuation process, minimize equipment damage, and prevent their spread.

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