

Sound and Air Pollution Monitoring System

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Abstract: The sound and air pollution monitoring system is the new concept and which we can use in various sectors. The Pollution is very big and dangerous issue in front of the world. So with help of this system we can detect the harmful and dangerous gases around us. We have Proposed a system which can detect excessive noise during festivals.

Keywords: Arduino, MQ135 Sensor, Microphone Sound Sensor, MQ2 Sensor, MQ7 Sensor, GSM.

INTRODUCTION

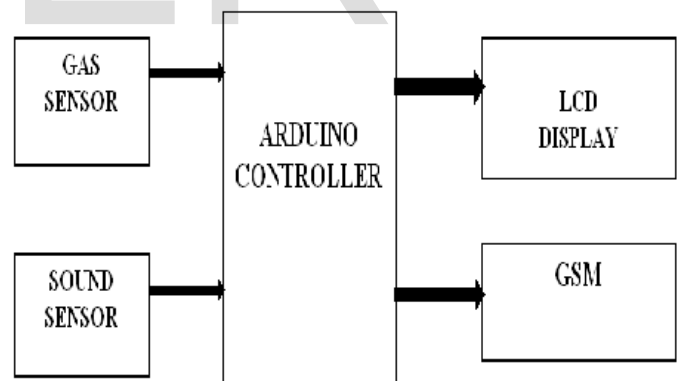
Present innovations in technology mainly focus on controlling and monitoring of different activities. These are increasingly emerging to reach the human needs. Most of these technologies are focused on efficient monitoring and controlling different activities. An efficient environmental monitoring system is required to monitor and assess the conditions. For exceeding the prescribed level of parameters such as noise, CO and radiation levels. When the objects like environment equipped with sensor devices, microcontroller and various software applications becomes a self-protecting and self-monitoring environment and it is also called as smart environment. In such environment when some event occurs the alarm or LED alerts automatically. The effects due to the environmental changes on animals, plants and human beings can be monitored and controlled by smart environmental monitoring system. By using embedded intelligence into the environment makes the environment interactive with other objectives, this is one of the application that smart environment targets.

Human needs demands different types of monitoring systems these are dependent on the type of data gathered by the sensor devices. Event Detection and Spatial Process Estimation are the two categories to which applications are classified. Initially the sensor devices are deployed in environment to detect the parameters while the data acquisition, computation and controlling action. Sensor devices are placed at different locations to collect the data to predict the behavior of a particular area of interest. The main interest of design and implementation of an efficient monitoring system through which the required parameters are monitored remotely using data gathered from sensors.

I. RELATED WORK

We Proposed system which can detect the harmful gases and Excessive noise. This system is new concept which can detect both Air and Sound pollution. The main part of this system is to sense the environmental conditions. The sensor we are using here is MQ135 and Microphone sound sensor. Sensor MQ135 is air quality sensor which is used to detect the harmful gases like NH₃, CO, CO₂ and SO₂. The MQ135 sensor is sense the condition and gives the signal

The block diagram for the working of the Sound and air pollution monitoring system is as following:



Here we are Proposed system in which the arduino is the heart of the system. The atmospheric condition is checking by the sensors all the time. When the sensed value reaches to the threshold point then sensor gives that information to the arduino. The sensor which we are using are MQ135, MQ2, MQ7 and Microphone sensor (Sound sensor). The MQ135 is used to measure the air quality of the atmosphere. MQ2 and MQ7 are the 2 sensors which are used to measure the smoke, alcohol and LPG. Microphone sensor shows the noise value in dB. We can set threshold value for noise then check it out weather value is exceeding then threshold

or not. When all this sensor checking out the conditions after that this sensors sends the signals to the arduino. After that arduino checks all sensors value. Arduino then processed the values and gives the signal to the GSM and Lcd display. This system is based on the arduino and all the processing is takes place in arduino only. The GSM used for the sending the message. It sends the exact values which is sensed by the sensors. And that will sends on number that we given. Lcd display is also used for shwing the exact values of the sensed by the sensor.

ARDUINO AND SENSORS

ARDUINO:

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++. An Arduino board consists of an Atmel 8-, 16- or 32-bit AVR microcontroller (although since 2015 other makers' microcontrollers have been used) with

complementary components that facilitate programming and incorporation into other circuits.

GAS SENSOR

1-MQ2 SENSOR:

The MQ-2 is a flammable gas and smoke sensor detects the concentrations of combustible gas in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of flammable gas of 300 to 10,000 ppm. The MQ-2 gas sensor is sensitive to LPG, i-butane, propane, methane, alcohol, Hydrogen and smoke. They are used in gas leakage detecting equipment' sin family and industry and in portable gas detector



Specification

- Supply Voltage:5V.
- Sensitive to H₂, LPG, CH₄, CO, Alcohol, Smoke or Propane.
- Analog and Digital Output.
- Digital Out is High or Low based on a adjustable present threshold.

2-MQ 135 SENSOR:

MQ-135 gas sensor applies SnO₂ which has a lower conductivity in the clear air as a gas-sensing material. In an atmosphere where there may be polluting gas, the conductivity of the gas sensor raises along with the concentration of the polluting gas increases. MQ-135 performs a good detection to smoke and other harmful gas, especially sensitive to ammonia, sulfide and benzene steam. Its ability to detect various harmful gas and lower cost make MQ-135 an ideal choice of different applications of gas detection



Specification

- Operating Voltage: 5V DC.
- Type: Analog & Digital.
- Detecting Type: Air Quality.
- Sensitivity to Ammonia, Sulphide and Benzene steam.
- Detecting Range: 100-1000ppm.

3-MQ7 SENSOR:

The MQ-7 is a Carbon Monoxide (CO) sensor suitable for sensing CO concentrations in the air. It can detect CO-gas concentrations anywhere from 20 to 2000 ppm. It makes detection by method of cycle high and low temperature, and detect CO at low temperature. It is widely used in domestic CO gas leakage alarm, industrial CO gas alarm and portable CO gas detector. The gas sensitive material used in MQ-7 gas sensor is SnO₂, which is of lower electrical conductivity in clean air. It detects carbon monoxide with low temperature (heated by 1.5V) through high-low temperature cycles. The electrical conductivity of the sensor increases with the increase of the carbon monoxide concentration in the air. The change of electrical conductivity can be converted to the output signal corresponding to that of the gas concentration by using a simple circuit. The sensitivity of MQ-7 gas sensor to carbon monoxide is quite high, so it can be used to detect various gas containing carbon monoxide. It is a low-cost sensor suitable for a variety of applications.



Specification

- circuit voltage= 5V+0.1A.
- Heating voltage (high)= 5V+0.1A.
- Heating voltage (low) =1.4V+0.1A.
- RL Load resistance Can adjust.
- RH Heating resistance =33Ω+5%.
- PH Heating consumption About= 350mW.

GAS SENSOR

1-MICROPHONE SOUND SENSOR:

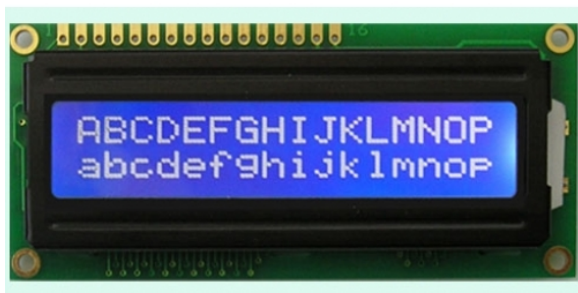
The sound sensor module provides an easy way to detect and is generally used for detecting sound intensity. This module can be used for security, switch and monitoring applications. Its accuracy can be easily adjusted for the convenience of usage. It uses a microphone which supplies the input to an amplifier, peak detector and buffer. When the sensor detects a sound, it processes an output signal voltage which is sent to a microphone then performs necessary processing. This module allows you to detect when sound has exceeded a set point you select. Sound is detected via a microphone and fed to arduino.



Specification

- Operating voltage range=3.3V.
- Operating current= 4.5.
- Voltage gain=26dB.
- Microphone sensitivity=52-48dB.
- Microphone frequency=16-20KHz.
- Microphone S/N ratio=54dB.

LCD Display:



LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of

blocking light rather than emitting it. An LCD is made with either a passive matrix or an active matrix display grid. The active matrix LCD is also known as a thin film transistor (TFT) display. The passive matrix LCD has a grid of conductors with pixels located at each intersection in the grid. A current is sent across two conductors on the grid to control the light for any pixel. An active matrix has a transistor located at each pixel intersection, requiring less current to control the luminance of a pixel. For this reason, the current in an active matrix display can be switched on and off more frequently, improving the screen refresh time (your mouse will appear to move more smoothly across the screen, for example). Some passive matrix LCD's have dual scanning, meaning that they scan the grid twice with current in the same time that it took for one scan in the original technology. However, active matrix is still a superior technology.

GSM :

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or bluetooth connection.

A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to serial port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management security applications, weather stations and GPRS mode remote data logging.



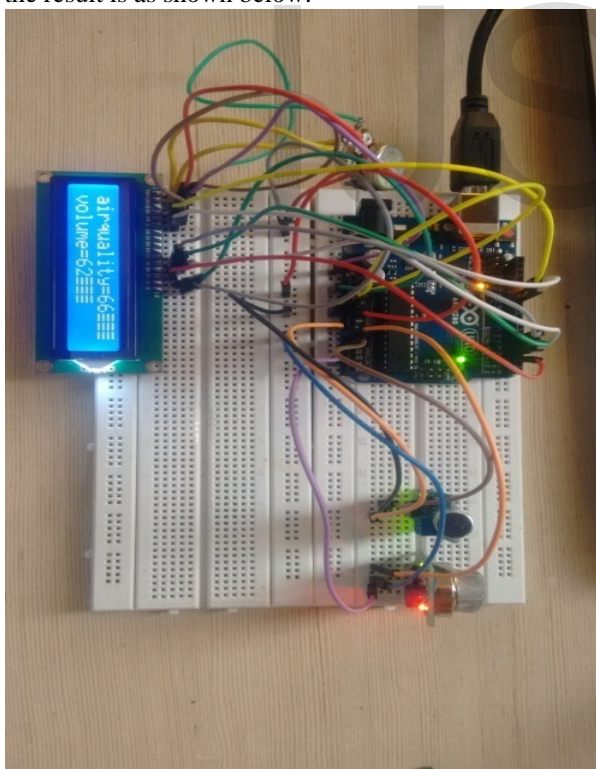
GSM is a standard developed by the European Telecommunications Standards Institute (ETSI) to

describe the protocols for second-generation (2G) digital cellular networks used by mobile phones, first deployed in Finland in July 1991. As of 2014 it has become the de facto global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories. 2G networks developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described as a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS). Subsequently, the 3GPP developed third-generation (3G) UMTS standards followed by fourth-generation (4G) LTE Advanced standards, which do not form part of the ETSI GSM standard.

pollution areas. In future this type of systems have to be implemented because with help of this system we can actually detect and monitor the pollution of air and sound. In big cities this system is very much useful because implementation cost is very much less than the big systems. So we have to think about future and make world pollution free

EXPERIMENTAL RESULTS

the result is as shown below:



CONCLUSION:

The proposed system is very much easy to implement. The concept is much new and we detect number of gases. The arduino and sensors are very less expensive so we can implement this system in high

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