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IOT BASED AIR AND NOISE POLLUTION MONITORING SYSTEM

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ABSTRACT: The Aim of this project is to monitor the level of CO and Noise in industrial areas.The solution includes the technology Internet of Things (IoT).The sensing devices are connected to the embedded computing system to monitor the fluctuation of parameters like noise and air pollution levels from their normallevels.

KEYWORDS:IOT,WIFI,SENSORS,ARDUINOATMEGA 328p

1. INTRODUCTION: In this project we are going to make an **IOT Based Air And Sound Pollution Monitoring System** in which we will **monitor the Air Quality over a webserver using internet** and will trigger a alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO2, smoke, alcohol, benzene and NH3. It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it veryeasily.

Previously we have built the LPG detector using MQ6 sensor and Smoke detector using MQ2 sensor but this time we have used MQ135 sensor which is the best choice for monitoring Air Quality as it can detects most harmful gases and can measure their amount accurately. In this IOT project, you can monitor the pollution level from anywhere using your computer or mobile. We can install this system anywhere and can also trigger some device when pollution goes beyond some level, like we can switch on the Exhaust fan or can send alert SMS/mail to theuser.

2. LITERATURESURVEY:

2.1 AIR AND SOUND POLLUTION MONITORINGSYSTEM

In this paper described that the co sensing and sound sensing technology has been among the topical research work for quite some time. This paper showcases the research done on the monitoring mechanism of CO in industrial areas. Micro-electro mechanical systems-based inter digital sensors were fabricated on oxidized single-crystal silicon surfaces by the mask less photolithography technique. The electrochemical impedance analysis of the sensors was done to detect carbon monoxide(CO) with and without coated particles of tin oxide (SnO2) in form of a thin layer. A thin film of SnO2 was spin-coated on the sensing surface of the inter digital sensor

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to induce selectivity to CO. This paper reports a novel strategy for CO detection under ambient temperature and humidity conditions. The response time of the coated sensor was encouraging and own a promising potential to the development of a complete efficient gas sensing system. [6] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety.

2.2 SCALE: SAFE COMMUNITY AWARENESS AND ALERTING LEVERAGING THE INTERNET OF THINGS:

In this project described that the Safe Community Awareness and Alerting Network (SCALE), a cyber-physical system (CPS) leveraging the pervasive Internet of Things (IoT) to extend a smarter, safer environmentto all companies at a low incremental cost. SCALE uses novel networking technologies, commodity sensor devices, cloud services,and middleware abstractions to sense, analyze, and act on sensed events in a distributed manner.It monitors environmental factors (i.e. smoke, explosive gas) and automatically alerts residents via phone upon discovery of a possible emergency, enabling them to confirm the event and contact emergency dispatchers with minimal effort. This article describes the inception, design, development, and deployment of a prototype system to achieve these goals. We discuss lessons learned and future directions for general CPS/ IOT platforms.

2.3 COSYSTEM

A **carbon monoxide detector** or **CO detector** is a device that detects the presence of the carbon monoxide (CO) gas in order to prevent carbon monoxide poisoning. In the late 1990s Underwriters Laboratories (UL) changed their definition of a single station CO detector with a sound device in it to a carbon monoxide (CO) alarm. This applies to all CO safety alarms that meet UL 2034; however for passive indicators and system devices that meet UL 2075, UL refers to these as carbon monoxide detectors. CO is a colorlesstasteless and odorless compound produced by incomplete combustion of carbon-containing materials. It is often referred to as the "silent killer" because it is virtually undetectable without using detection technology and, in a study by Underwriters Laboratories, "Sixty percent of Americans could not identify any potential signs of a CO leak in the home". Elevated levels of CO can be dangerous to humans depending on the amount present and length of exposure. Smaller concentrations can be harmful over longer periods of time while increasing concentrations require diminishing exposure times to be harmful.

3. COMPUTATIONAL ANALYSIS ON ENVIRONMENTALPARAMETER:

Here we include some basic analytics methods to calculate the pollution parameters, like noise levels and CO levels in the surrounding environment. The common unit of measurement for sound is decibel, dB and its intensity is measured in Sound Pressure Level (SPL). The noise levels are measured in the A– weighted (low-level sensitivity) SPL, abbreviated as dB (A). Sound of frequencies from 800 to 3000Hz is covered by the A–weighted scale. If the SPL, L1 in dB is measured at r1 meters, then SPL, L2 in dB at r2 meters is given by L2 = L1 - 20 log10 (r2/r1) Day – Night equivalent noise levels (Ldn) of a community can be expressed as Ldn, dB(A) = 10 * log10[15/24(10Ld/10)+ 9/24(10(Ln+10)/10)] Where, Ld= day- equivalent noise levels (from 7AM – 10PM), dB(A) Ln = night-equivalent noise levels (from 10PM – 7AM), dB(A) Based on intensity, the sound intensity I may be expressed in decibels above the standard threshold of hearing I0. The expression is I(dB) = 10 log10[II0] intensity indecibels

Then we will connect the **MQ135 sensor with the Arduino**. Connect the VCC and the ground pin of the sensor to the 5V and ground of the Arduino and the Analog pin of sensor to the A0 of the Arduino.

Table 6.1 STANDARD FOR NOISE VALUES

N	D	TYPE OF REGION
4	55	RESIDENTIAL
4	60	RESIDENTIAL-COMMER
5	65	COMMERCIAL
6	70	COMMERCIAL-INDUSTR
6	75	INDUSTRIAL

The usual reference method for the measurement of carbon monoxide concentration in air is based on the absorption of infrared radiation by the gas in a non-dispersive photometer. This method is suitable for stable installations at fixed-site monitoring stations. More recently, portable carbon monoxide analyzers [9] with automated data-logging have become available for personal exposure monitoring. These measurements are based on the electrochemical reactions between carbon monoxide and de-ionized water, which are detected by specially designed sensors. Nowadays the resolution, stability and sensitivity of the electrochemical analyzers are within the specifications of the

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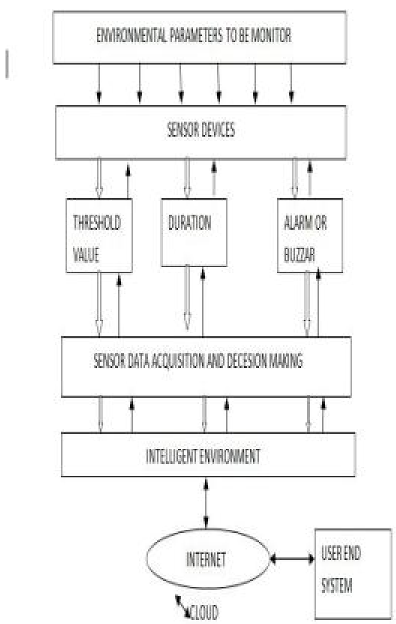
reference method and, together with the data-logging systems, they fit into a small rucksack oreven a pocket. Conversion factors 1 ppm =1.145 mg/m3 1 mg/m3 = 0.873 ppm Using the Table 1 and values obtained from above calculations, the threshold value can be set to the requirements dynamic nature of the environment and to monitor the parameters.

3.1 FLOW CHART



4. CIRCUIT DIAGRAM AND EXPLANATION:

First of all we will connec **ESP8266 withtheArduino**. ESP8266 runs on 3.3V and if you will give it 5V from the Arduino then it won't work properly and it may get damage. Connect the VCC and the CH_PD to the 3.3V pin of Arduino. The RX pin of ESP8266 works on 3.3V and it will not communicate with the Arduino when we will connect it directly to the Arduino. So, we will have to make a voltage divider for it which will convert the 5V into 3.3V. This can be done by connecting three resistors inseries ike we did in the circuitConnect the TX pin of the ESP8266 to the pin 10 of the Arduino and the RX pin of the esp8266 to the pin 9 of Arduino through the resistors.

ESP8266 Wi-Fi module gives your projects **access to Wi-Fi or internet**. It is a very cheap device and make your projects very powerful. It can communicate with any microcontroller.

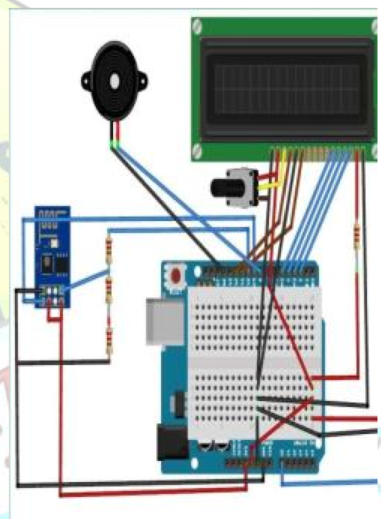
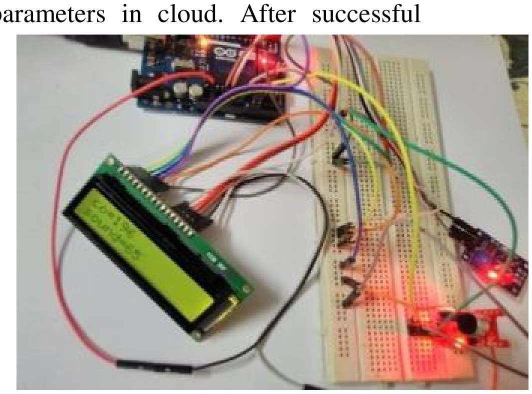


FIG 4.2 CIRCUIT DIAGRAM

5. RESULT

5.1 OUTPUT

The below figure shows that the embedded system with its components for reading and to store the pollution parameters in cloud. After successful



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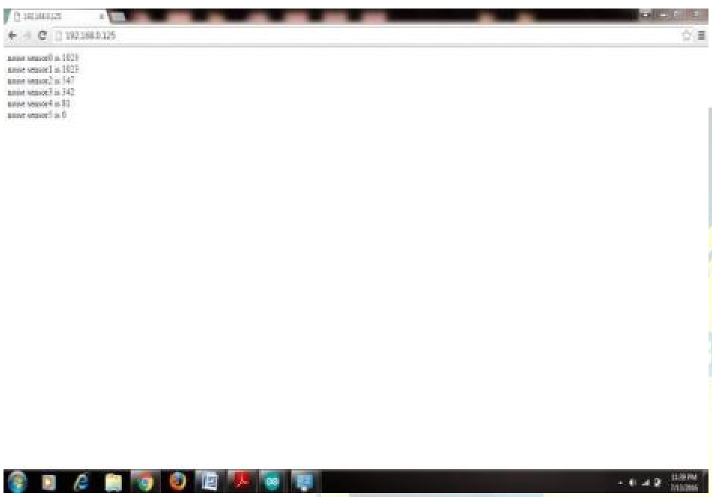
completion of sensing, the data will be processed and stored in database for future reference. After completing the analysis on data the threshold values will be set for controllingpurpose

FIG 5.1 OUTPUT IN LCD

6. FIG 5.2 VALUE IN WEB PAGE



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