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E-Mail

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DEVELOPMENT OF IOT BASED COAL MINE SAFETY MONITORING

P NANDHA KUMAR ¹, GAJULA RAKSHIKA², NANDHIKONDA NANDHINI³,
PAGIDIKATHULA SIVAGANESH⁴, DUDDUKUNTA SRINIVASA REDDY⁵

¹ Assistant Professor, Dept of ECE, MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS),
Hyderabad, TG, India.

^{2,3,4,5}UG students, Dept of ECE, MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS),
Hyderabad, TG, India.

ABSTRACT:

Fire Detectors play a very important role in Industries, Shops, Malls, Residential complexes, parking areas, etc. They help in detecting fire or smoke at an early stage and can help in saving lives. Commercial Fire detecting systems usually have an alarm signaling, with the help of a buzzer or Siren. We have designed an IOT based Fire Alerting System using Temperature and a smoke sensor which would not only signal the presence of fire in a particular premise but will also send related information through IOT. Internet of Things (IoT) is basically the network of 'things' by which physical things can exchange data with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction. In this Arduino fire alarm system using temperature and smoke sensor using the IOT project, we can send LIVE information like Temperature, Smoke Value detected by a particular device to the Fire Department. This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Full wave bridge rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

Keywords: *IOT platform, Wifi, ESP8266, Gas sensor, fire sensor .*

1. INTRODUCTION:

FIRE AND GAS is that the abbreviation or short kind for liquefied

oil gas. Like all fossil fuels, it's a non-renewable supply of energy. It is extracted from fossil oil and gas. The

most compositions of FIRE AND GAS square measure Hydrocarbons containing three or four carbon atoms. The conventional parts of FIRE AND GAS so, square measure gas (CH₄) and alkane (C_nH_{2n+2}). Tiny concentrations of alternative hydrocarbons may additionally be gift betting on the supply of the FIRE AND GAS and the way it's been created, parts apart from hydrocarbons may additionally be gift. FIRE AND GAS is extremely combustile and should thus be hold on off from sources of ignition and during a well-ventilated space, in order that any run will disperse safely. FIRE AND GAS vapors is heavier than air thus care ought to be taken throughout storage in order that any run won't sink to the bottom and find accumulated in a district that is low lying and tough to disperse. FIRE AND GAS gas is largely gas and alkane and it's scentless in its state of nature. The smell that we tend to notice once there's a run is really of a wholly totally different agent, referred to as alkyl radical Mercaptan. This substance is additional to the gas once it leaves the

most storage terminals [1]. The prime aim of paper is to detect Gas leakage in home, hotels, schools and other domestic areas, and gives alert message to the surrounding people. Nowadays Gas sensors are being used globally in the field like safety, health, instrumentation etc. This paper is an implementation of the same using MQ-5 gas sensor and DHT11 temperature sensor. The MQ5 sensor is commonly used for detecting gas leakage for various applications and the DHTIL is used for measuring the humidity and temperature of surrounding area. The device also keeps displaying the leakage amount and humidity & temperature on an LCD display. The MQ6 gas sensor detects the concentration of gas in ppm and outputs analog value which can be converted to a digital signal using inbuilt Analog to Digital Convertor of Arduino. The paper allows the user to set the low, medium and dangerous level for leakage based on the same digital measure. The intensity values are compared with two predetermined thresholds and based on

that, it classifies it into three different classes of concentration of leakage [2].

OVER VIEW:

There are about 89% householder's uses FIRE AND GAS cylinders in India. The Several requirements have been carried out for the fuel leakage detection system. The current structures offers an alarm machine which is on the whole supposed to discover an Gas leakage in the house and industrial premises The goal of the proposed machine is to always measure the weight of the cylinder and as quickly as it reaches the minimal threshold it will routinely sends an SMS alert to the consumer as nicely as Authorized FIRE AND GAS agent so that they can act accordingly. This machine additionally designed to realize FIRE AND GAS gases such as propane and butane. The allowed degree for butane is 600ppm above which it is regarded to be of excessive degree and poses a danger. The threshold stage of weight of the cylinder is used for automated cylinder booking. The foremost intention of this venture is

to screen for liquid petroleum gasoline (FIRE AND GAS) leakage to keep away from primary hearth accidents and additionally facilitating protection precautions the place protection has been an essential trouble and automated cylinder reserving except human intervention. The gadget detects the leakage of the FIRE AND GAS the usage of gasoline sensor and signals the customer about the fuel leakage by way of sending SMS. The gadget measure the weight of cylinder by using the use of weight sensor and show corresponding weight in FIRE AND GAS display. The proposed gadget makes use of the GSM Modem to alert the man or woman about the gasoline leakage by way of SMS and repete of automated cylinder booking. When the machine identifies that FIRE AND GAS attention in the air reaches the designated degree then it alert the purchaser via sending SMS to registered cellular Smartphone and alert the humans at domestic via activating the alarm which consists of Buzzer concurrently and additionally show the identical message on LCD to take the fundamental

motion and change on the exhaust fan or opening home windows to limit the fuel attention in the air.

2. LITERATURE SURVEY:

In the year 2011, A. MAHALINGAM, R. T. NAAYAGI¹, N. E. MASTORAKIS, “Design and Implementation of an Economic Gas Leakage Detector”, This project developed system to detect the gas leakage and providing immediate alarm or intimation to the user. Later in 2013, few people developed the design proposed for home safety. This system detects the leakage of the FIRE AND GAS and alerts the consumer about the leak by buzzer.

This project was developed using microcontroller ARM version 7 processor and simulated using Keil software. In the year 2014, Hitendra Rawat, Ashish Kushwah, Khyati Asthana, Akanksha Shivhare, designed a system, They provided

security issues against thieves, leakage and fire accidents. In those cases their system sends SMS to the emergency number provided to it. In the proposed system we have designed “FIRE AND GAS gas monitoring and automatic cylinder booking with alert system”. These report focus on detection of economic fuels like petroleum, liquid petroleum gas, alcohol..etc., and alert the surrounding people about the leakage through SMS. It also sense surrounding temperature, so that no fire accidents occurs. The one more important feature is automatic cylinder booking by noticing the current expenditure of FIRE AND GAS gas in our daily life. These projects alert the user by sending message to mobile through SMS in three conditions. They are

When FIRE AND GAS gas weight reaches to maximum threshold value.

When the FIRE AND GAS gas exceed its peak value.

When the temperature exceed more than room temperature.

These project gives alert message by buzzing the buzzer and trough SMS to the house holders. We also provide automatic doors and windows opening, so that the compressed gas can spread in to air freely. Hence a fire accident does not occur.

In the slide share document (2014); They introduce a golem and mobile application for the in the meantime, the system image has impressively incontestable its use and capability in intensive series of tests. The drive unit, the navigation system and, therefore, the complementary detector systems performed fantastically throughout the tests. Moreover, it helps to avoid practice of human inspectors in in all probability dangerous environments. However,

before activity in industrial settings, a lot of development is required (e.g., in explosion protection, package development, etc.), and if truth be told legal issues ought to be processed before activity in business settings. Still, it's sure that AN autonomous, mobile gas detection and leak localization golem is feasible these days and might considerably enhance safety [4].

Pal-Stefan et.al (2008); Introduced few old and new technologies to detect the gas. In this the proposed techniques are nontechnical, acoustic methods, optical methods and active methods. Survey says wide range of techniques are available for Gas detection. However, each applications has few of the limitations [5]

Manichandana Simrah et.al (2019); in this paper they told about their research on leakage detection and analysis of leakage point in the gas pipeline system. In this paper they

gave various model which used SCADA I/F Model: The SCADA system has the function of transferring the acquired data from a pipeline system to Transient Simulation Model every 30 seconds. This module communicates with SCADA. Dynamic parameters are collected every 30 seconds, such as pressure, flow and temperature. Transient Simulation Model: Transient flow is simulated utilizing perfect numerical methods based on actual data. Pressure and temperature served as independent variables are provided in order to get average pressure and average temperature [6].

3. PROPOSED SYSTEM:

FIRE AND GAS and fire Detectors play a very important role in Industries, Residential complexes, parking areas, etc. They help in detecting fire or smoke at an early stage and can help in saving lives. Commercial FIRE AND GAS and fire

detecting systems usually have an alarm signaling, with the help of a buzzer or Siren. We have designed an IOT based Fire Alerting System using Temperature and a smoke sensor which would not only signal the presence of fire in a particular premise but will also send related information through IOT. Internet of Things (IoT) is the networking of 'things' by which physical things can communicate with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction and same is the case with iot based gas detection system, it does not require human attention.

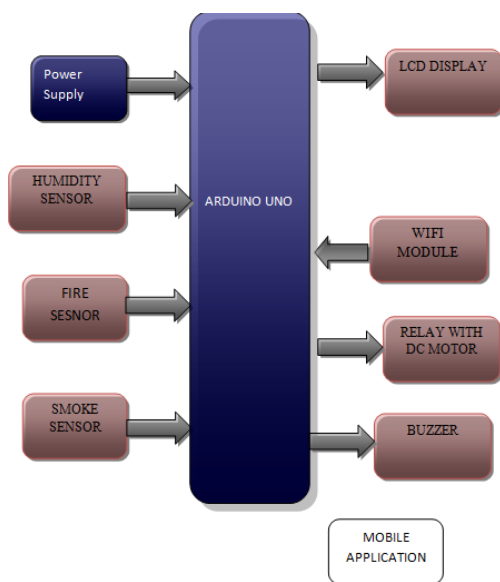


Fig.3.1. Hardware block diagram.

4. RESULTS EXPLANATION

IOT and Arduino based FIRE AND GAS leakage detection system senses the FIRE AND GAS gas with the help of an FIRE AND GAS gas sensor. FIRE AND GAS gas sensor interfacing with Arduino is implemented in this project. The Signal from this sensor is sent to the Arduino microcontroller. The microcontroller is connected to an LCD, Buzzer and IOT module (ESP8266). IOT FIRE AND GAS leakage detector project is implemented using an ESP8266 chip. This is a WiFi module which is used for connecting microcontrollers to Wi-Fi network and makes TCP/IP connections and sends data. Data, which is sensed by these sensors, is

then sent to the IOT. The IOT module then sends the data over to a website. Once the gas leakage is detected, the buzzer is turned ON and a 'Leakage detected' message is displayed on the LCD. The Pre-requisite for this FIRE AND GAS gas leakage detection and the smart alerting project is that the Wi-Fi module should be connected to a Wi-Fi zone or a hotspot. This project is also implemented without the IOT module. . In place of the IOT module, we have used a WIFI module, by which an SMS is triggered.

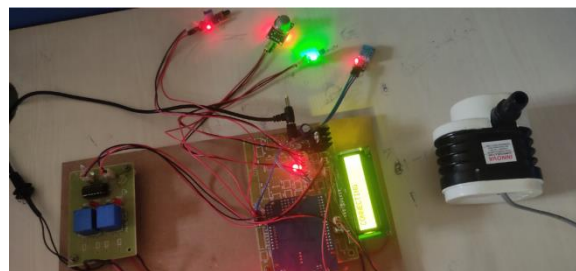


Fig.1. Hardware kit

OPERATION:

We have used various components in the IOT and Arduino based FIRE AND GAS leakage detection system. FIRE AND GAS Gas Sensor is used to detect the gas leakage. Arduino is used to turning ON the buzzer, to send a message to LCD and to send data to the IOT module. LCD is used to display an informative message. A buzzer is used to

signal the gas leakage. And ESP8266 is used to send data over a Wi-Fi network.

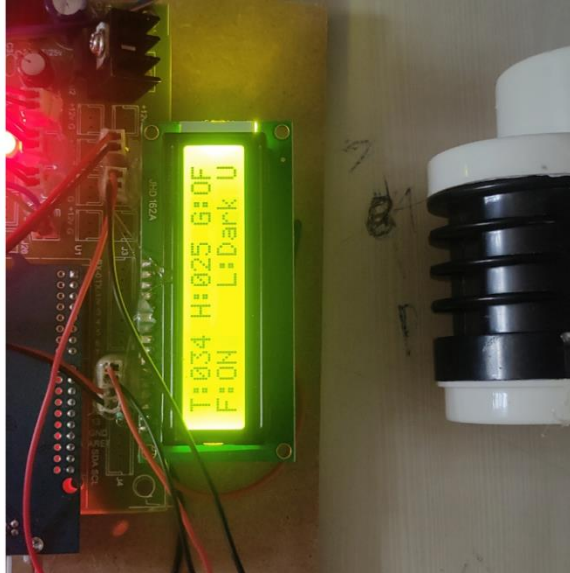


Fig.4.2. Sensors data in LCD.

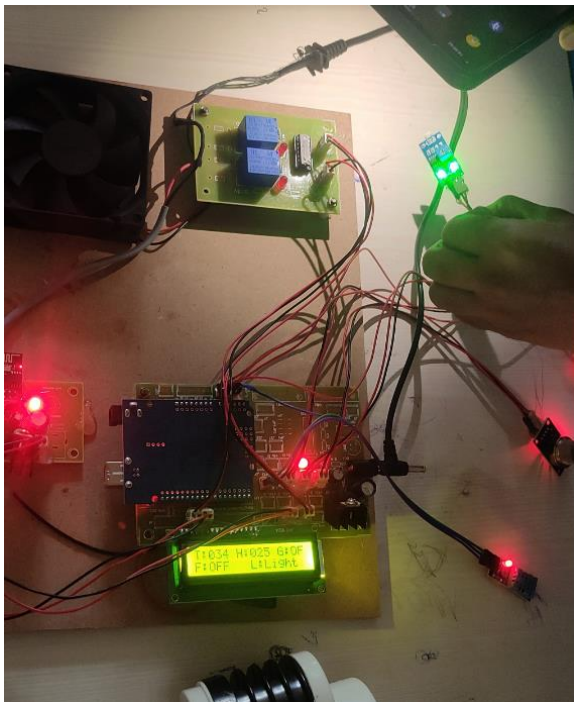


Fig.4.3. LDR sensor data.

S.No	Temperature	Humidity	Gas	Fire	LDR	Date
1	31	30	OFF	ON	Dark	2024-04-23 13:34:25
2	31	30	ON	OFF	Dark	2024-04-23 13:33:51
3	31	30	ON	OFF	Dark	2024-04-23 13:33:31
4	31	30	ON	OFF	Dark	2024-04-23 13:33:11
5	31	30	ON	OFF	Dark	2024-04-23 13:32:51
6	31	30	ON	OFF	Dark	2024-04-23 13:32:30
7	30	30	ON	OFF	Light	2024-04-23 13:32:10
8	30	30	ON	OFF	Dark	2024-04-23 13:31:50
9	30	30	ON	OFF	Dark	2024-04-23 13:31:29
10	30	30	ON	OFF	Light	2024-04-23 13:31:09
11	30	30	ON			2024-04-23 13:30:49
12	37	25	ON	OFF	Dark	2024-02-23 10:42:26
13	28	35	ON	OFF	Dark	2024-02-23 10:40:02
14	29	34	ON	OFF	Dark	2024-02-23 10:36:31
15	29	35	OFF	ON	Dark	2024-02-23 10:30:19
16	28	35	ON			2024-02-23 10:27:31
17	29	25	ON	OFF	Dark	2024-02-17 21:00:28
18	29	25	OFF	ON	Light	2024-02-17 20:59:36
19	29	25	OFF	ON		2024-02-17 20:54:49

Fig.4. Output results in Server.

5. CONCLUSION:

Fire safety measures and equipment in the workplace must be kept in effective working order. This includes all fixtures and fittings such as fire doors, staircases, corridors, fire detection and alarm systems, fire-fighting equipment, notices and emergency lighting. Regular checks, periodic servicing and maintenance must be carried out, whatever the size of the workplace. Any defects should be put right as quickly as possible. An employer or nominated employee can carry out checks and routine maintenance work. However, it is important to ensure the reliability and safe operation of fire-

fighting equipment and installed systems such as fire alarms and emergency lighting. This is best done by using a competent person to carry out periodic servicing and any necessary repairs. A record of the work carried out on such equipment and systems will help to demonstrate compliance with the law.

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