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Underground Mine Gas Monitoring System

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Abstract - *As we know the safety of the worker working in a mine should have the utmost priority in a mining company. So this device is made to monitor the different Gas levels inside a mine. This project contains a device that can be worn by the worker on the wrist or on their helmet while working in mine. It contains different gas sensors which tell the worker about the gas levels of different gases present in the mine. The sensor detects the value of a specific gas and sends it information to the microcontroller. The microcontroller then sends this information on the LCD screen or on the Android app through a communication device (Bluetooth module). If a gas level is above the recommended level, then the microcontroller sends a signal to the buzzer and an alarm is generated which warns the workers in the mine to evacuate from the mine and get to a safe place.*

Key Words: **Intelligent sensor system, coal mine security system, security system, alert switch.**

1. INTRODUCTION

This project provides the safety of mining workers, there are so many harmful gases present in the mining area that could lead to death of a worker so in order to prevent this situation, our system is consisting of many gas sensors to detect the level of gases like methane, carbon monoxide etc. This system remains along with worker and monitor all the gases level present and soon as it detect any abnormalities in the gas level it will generating warning alarm at the workers side as well as this system keeps on transferring this gas level data to the monitoring room wireless in order to monitor the workers surrounding.

2. Hardware

2.1 Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P (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.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and Software (IDE) were the reference versions of Arduino, was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index boards.

Fig.1 Arduino Uno

2.2. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a good range of applications. A 16x2 LCD display is extremely basic module and is extremely commonly utilized in various devices and circuits. These modules are over seven segments and other segment LEDs. The reasons are: LCDs are economical; it is easily programmable; haven't any limitation of displaying special & even custom characters (unlike in seven segments), animations.

2.3. Mini Buzzer

This little unit makes a beep sound when power is supplied to it via transistors, microcontrollers etc. They are normally used as an audible indication for some reason like a temperature upper limit is reached, errors occurred etc. This 6V active buzzer has small PC boards build in for sound generation and can thus be used without microcontrollers or circuits that need to generate an audible sound. In short, they only require power.

3. SENSORS

3.1 MQ-135

Air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory. MQ136 gas sensor has high sensitivity to Ammonia, Sulphide and Benzene steam, also sensitive to smoke and other harmful gases. It is with low

cost and particularly suitable for Air quality monitoring application.

3.2 MQ-7

MQ-7 Semiconductor Sensor for Carbon Monoxide Sensitive material of MQ-7 gas sensor is SnO2, which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.6V). The sensor's conductivity is more higher along with the gas concentration rising. When high temperature (heated by 6.0V), it cleans the other gases adsorbed under low temperature. Please use simple electrocircuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-7 gas sensor has high sensitity to Carbon Monoxide. The sensor could be used to detect different gases contains CO, it is with low cost and suitable e for different application.

3.3 MQ-2

MQ2 is one of the commonly used gas sensors in MQ sensor series. ... MQ2 Gas sensor works on 5V DC and draws around 800mW. It can detect LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide concentrations anywhere from 200 to 10000ppm. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. The sensitivity of the sensor can be adjusted by potentiometer.

4. FUTURE SCOPE

We can add a keypad to arm or disarm the alarm. We can also determine the position of the intruder and then send a SMS to the concerned authorities.

5. CONCLUSION

The "Underground mine gas monitoring system" was designed for the safety of mining workers as there are so many harmful gases present in the mining area that could lead to death of a worker so in order to prevent this situation, our system is consisting of many gas sensors to detect the level of gases like methane, carbon monoxide etc.

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