



IN HEAVY INDUSTRIES, A SAFETY SYSTEM FOR MINE WORKERS

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Abstract: This paper describes the work that was done to design and construct a prototype mine protection device using a wireless sensor network, with the aim of creating a safety system to monitor the environmental parameters of the mining region. A overview of the most recent studies on miner health and welfare, as well as mine safety initiatives, is included. Subsystems of the test system are then simulated. The hardware consisted of electrical circuits with a microcontroller as the primary processing unit. A graphical user interface is often used.

Mine Security; Wireless Sensing Networks; WIFI Module; Arduino Mega; LCD Display; Sensors

1. Introduction

In terms of worker safety and health, a mining operation is a hazardous enterprise. These dangers arise from the various methods used to harvest various minerals. The higher the danger, the deeper the mine. These safety concerns are particularly concerning in the coal industry. As a result, worker safety should always be a top priority in any kind of mining, whether it's for coal or other minerals. Because of the difficulties with ventilation and the possibility for collapse, underground coal mining poses a greater danger than open pit mining. In all kinds of mining, however, the use of heavy equipment and the techniques used during excavations pose a safety risk. Modern mines often employ a variety of safety measures, worker education and training, and health and safety regulations, all of which result in significant changes and advances in both opencast and underground mining safety. Coal has traditionally been

India's main source of energy, and it has played a key role in the country's fast industrialization. Coal is responsible for about 70% of all power production, making its significance in the energy industry unavoidable. However, the manufacturing process generates additional byproducts, which pose a possible danger to the environment and the individuals involved. In lieu of that, the current effort is a genuine endeavor to analyze the gravity of the situation and develop a real-time detection monitoring system based on ZigBee technology.

2. SURVEY ON LITERATURE:

This paper describes the work that was done to design and construct a prototype mine protection device using a wireless sensor network, with the aim of creating a safety system to monitor the environmental parameters of the mining region. A overview of the most recent studies on



miner health and welfare, as well as mine safety initiatives, is included. Subsystems of the test system are then simulated. The hardware consisted of electrical circuits with a microcontroller as the primary processing unit. A graphical user interface is often used. For certification, a variety of tests are administered. Temperature, humidity, airflow, and noise sensor readings are accurate to 89.01 percent, 98.55 percent, 90.5 percent, and 89.53 percent, with a resolution of 0.105?? C, 0.12 percent RH, 0.05 m/s, and 0.23 dB SPL, respectively. Two monitored outputs were added in the form of ventilation switching and a noise prevention system. [Reference Number 5]

BLOCK DIAGRAM:

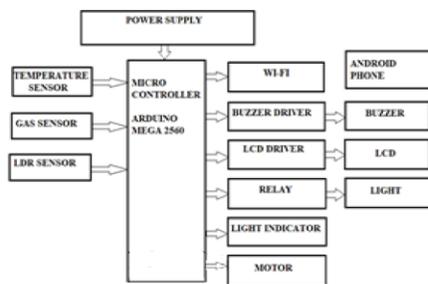


Figure 1: Block Diagram

EXISTING SYSTEM:

Wired networking was the emphasis of the previous system. The physical limitation of wired technology is that wires may be easily broken. Workflow will be disrupted while workers rewire sections inside the business. It's risky and difficult to rely on such a gadget. It is inflexible and lacks a connected infrastructure.

SYSTEM RECOMMENDED:

The suggested gadget is built on wireless sensor technologies. The proposed system

combines the sensor sheet, the logic layer, and the development layer. Real time becomes more important in a multi-threat scenario. This machine, to a great extent, saves human initiative and time.

2. HARDWARE MODULES:

1. ARDUINO (2560): MEGA

The Arduino Super 2560 is a microcontroller module that relies on the ATmega2560-based ATmega2560-based ATmega2560-based ATmega2560-based ATm It includes 54 specialized information/yield pins, 16 basic data sources, 4 UARTs (equipment sequential ports), a 16 MHz precious stone oscillator (of which 15 may be used as PWM yields), and a 16 MHz precious stone oscillator (of which 15 can be used as PWM yields).

2. MODULE WI-FI:

The ESP8266 Wi Fi Module is an isolated SOC with a built-in TCP/IP convention stack that connects any microcontroller to your Wi Fi network. The ESP8266 will either promote or unload all Wi-Fi organizing functions from the application's other CPU.

3. POWER SUPPLY:

The portion of the force that allows the components to work with +5V is known as the versatile zone of force. The IC LM7805 is used to provide a constant voltage of +5V. The air conditioner's voltage, which is typically 220V, is linked to a transformer, which lowers the voltage to the degree of the optimum dc yield.

RELAY MODULE NO. 4:

Switch Shield employs top-notch hand-off with four channel input and four channel



yield. It may be linked to the most severe part of 250V/10A AC or 24V/10A DC and used to power lights, engines, and other devices along these lines.

5. LCD (Liquid Crystal Display):

LCDs consume much less power than LED and gas display displays, a type of flat panel display that utilizes liquid crystals as its main mode of activity, since they operate on the idea of blocking light rather than LCD (Liquid Crystal Display). LEDs may be found in a broad variety of applications for consumers and businesses, including laptops, TVs, computer displays, and instrument panels. In terms of the technologies they have replaced, such as light-emitting diode (LED) and gas-plasma display, LCDs have made a considerable leap.

BUZZER:

Bell is a kind of electronic sound collector with a networked architecture. As a speech device, it's frequently found in electronic products like PCs, scanners, duplicating devices, caution contraction, electronic games, auto electronic devices, tablets, and so forth.

7. LDR SENSORY:

The LDR sensor module measures the intensity of light. It applies to both the basic yield pin and the advanced yield pin, which are labeled AO and DO on the board. When there is light, the LDR obstacle shrinks to a minuscule size because to the force of light. The LDR blockage is smaller the stronger the light force is. The potentiometer on the sensor has a handle that may be acclimatized to alter the LDR's affectability to light.

SENSOR DE TEMPERATURES:

The temperature sensor LM35 semiconductor is used in this LM35D Analog Temperature Sensor Module. The LM35 Linear Temperature Sensor module is helpful for determining the air temperature. Affectability is measured in millivolts per degree Celsius.

9. ENGINE:

The motor with direct current (DC) and the motor with alternating current (AC) are the two types of electric motors (AC). In this article, we will study about the DC motor and its operation. As well as, for example, the DC engine gear.

3. RESULT:

Step 1: When the circuit is powered up, the Arduino mega (2560), three sensors, LCD, wifi module, and motor are all activated. Temperature, gas, and LDR sensors all begin detecting at the same time.

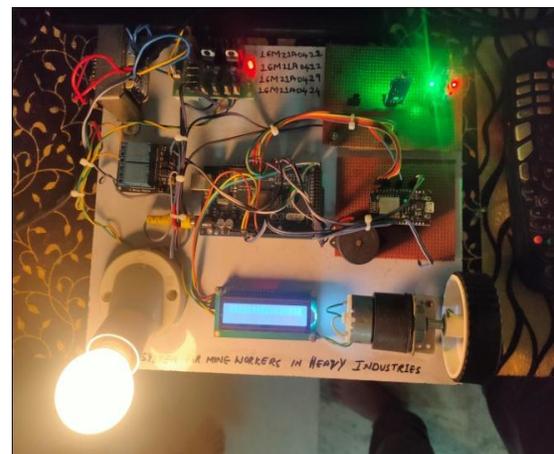


Figure 1

Step2: Microcontroller gets triggered and send the information through wifi module by using TCP/IP protocol to the base station.

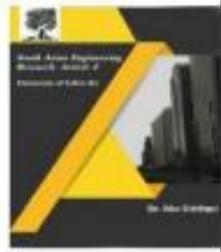
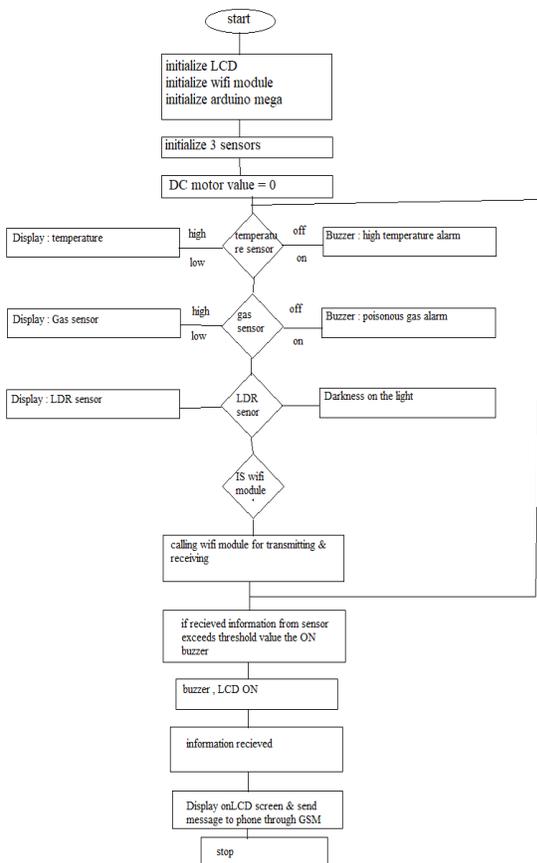


Figure 2

FLOW CHART:



CONCLUSION AND FUTURE SCOPE:

Fire is a major threat that may cause significant damage to the mine's environment. Fire suppression is an

additional subsystem that may be included in the mining safety architecture. This will need the use of a smoke sensor and a monitorable fire retardant equipment.

CONCLUSION: A complete mine protection system has been constructed using a combination of mechanical hardware, electrical hardware, and specialized software, resulting in a system that is lightweight and adaptable. This gadget will compute environmental parameters in the setting of a mine.

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