Retraction

Retraction: Safety Monitoring System in Coal Mine Using IoT (J. Phys.: Conf. Ser. 1916 012196)

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This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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Safety Monitoring System in Coal Mine Using IoT

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Abstract. The key abstract is to use IoT to incorporate a coal mine safety monitoring system. The extraction of coal from the field is known as coal mining. Coal is used as a fuel in the steel and cement industry to extract iron from ore and to manufacture cement. Every parameter in the underground mining industry must be controlled on a regular basis, including methane gas, high temperatures, fire incidents, and so on. The level of safety in coal mines is still poor, resulting in fatalities. A coal mineshaft salvage action is profoundly perilous because of various elements. It is particularly risky for rescuers to enter a coal mineshaft burrow in a debacle without earlier attention to the climate on the ground that ensuing blasts are probably going to happen at any second. It is along these lines basic to recognize unstable climate data like toxic gases and high temperatures, just as to direct a visual review of excavators caught in a fell passage through the imploded burrow. These information would aid rescuers in devising a strategy and equipping themselves to carry out the rescue operation defensively. This paper proposes a design for coal mines that will reduce the damage caused by a coal mine accident and allow for a more effective rescue operation.

1. Introduction

Customary coal mineshaft observing frameworks are regularly wired organization frameworks that assume a significant part in deciding coal mineshaft wellbeing. If any kind of explosion occurs, the wired network will get damaged and it is very difficult to replace it. It will take high time consumption to repair those networks[1-2]. In order to overcome this, the coal mine safety measurement system using Internet of Things was designed and implemented. The device entails creating a Wireless Sensor Network (WSN) using an Arduino UNO controller to track the underground mine's condition[3-5]. This improves production safety control and reduces coal mine accidents. Wireless sensor networks are made up of a large number of micro-sensor nodes that have a small volume and low cost and can be deployed anywhere, while laying cable for underground monitoring is a complex, time-consuming, and costly operation[6-7]. The model is made up of a gas sensor, a temperature sensor, and a humidity sensor (AM2302), Heart beat sensor, Vibration sensor, Blood rate sensor, MEMS sensor, A power supply unit, LED display and a buzzer.
2. Block Diagram

![Block Diagram]

**Figure 1.** Block diagram of the system.

The conventional approach of using wired network networks for coal mine control, i.e. laying underground cables or parallel lines, proved inconvenient for safety reasons. In the underground mining area, the methane gas level present in the mine is detected by Electronic Gas Sensor. The climatic conditions in underground mine including temperature and humidity is measured by the Temperature sensor. The vibrations occurring in the mines while mining is detected using the Vibration sensor. This senses the vibration level and occurrence of earthquake can be known easily. With a power supply given, the data which the various sensors collect are fed to the Arduino UNO, the numbers are displayed in the LCD display module. The numbers also check with the maximum level each parameter like gas, pressure, temperature, vibration etc., using the IoT module. If the number crosses the predefined level, the buffer buffers and gives alert to the miners. The machine collects data in a coal mine using a sensor network based on (MEMS) Micro Electrical Mechanical Systems. The sensor module is made up of MEMS sensors that range in size from 1 to 100 micrometres. The Arduino receives the sensed data and transmits it. The mining staff are notified when a parameter's extreme condition is detected. This is the rationale for the block diagram shown in Figure 1.

3. Hardware Description

**A. Arduino UNO**

A microcontroller is a small computer with a processor core, memory, and programmable input/output peripherals on a single integrated circuit. The important part for us is that a microcontroller has a processor (which all computers have) and memory, as well as some controllable input/output pins. This kit includes a microcontroller as well as all of the required extras to make building and debugging your projects a breeze. The ATmega328P is utilized in the Uno shown in figure 2 which is a microcontroller board. There are 14 advanced information/yield pins (six of which can be utilized as PWM yields), six simple data sources, a 16 MHz quartz precious stone, a USB interface, a force jack, an ICSP header, and a reset button on the board. It incorporates all you'll require to begin with the microcontroller, including a USB link to associate it to a gadget and an AC-to-DC connector or battery to control it.
B. Gas Sensor

The Gas sensor shown in figure 3 has a high sensitivity as well as a quick response time. Iso-butane, propane, and methane can all be detected by the sensor. Biometric sensors, electrochemical sensors, and Metal Oxide Semiconductor sensors are the three types of gas sensors. A sensor is used in gas detectors to determine the concentration of specific gases in the atmosphere. When a chemical reaction triggered by a particular gas occurs, the sensor acts as a reference point and scale, generating a measurable electric current.

![Figure 3. Gas Sensor](image)

C. Temperature Sensor

The LM35 shown in figure 4 has arrangement of exactness coordinated circuit temperature sensors have a yield voltage that is directly relative to the temperature in Celsius (Centigrade). The Sensor is more precise than a thermistor at measuring temperature. The sensor circuitry is sealed and not susceptible to oxidation or other forms of degradation. The LM35 produces a higher output voltage than thermocouples, so it might not be necessary to amplify the output voltage.

![Figure 4. Temperature Sensor](image)

D. Vibration Sensor

In the event of a debris flow, vibration sensors shown in figure 5 will sense the vibration of the ground soil. Prior to installing a vibration sensor, it's critical to figure out what amount of vibration can activate the sensor in the event of a debris flow. It's also necessary to consider the possibility of
unintended sensor activation triggered by earthquakes, as well as areas where there's construction traffic and other vibration sources. Monitoring vibration levels over time allows for early detection of issues until they become dangerous. Machine-mounted sensors are important for vibration monitoring and analysis.

Figure 5. Vibration Sensor

E. MEMS Sensor

Micro Electro Mechanical Systems (MEMS) shown in figure 6 is a shortening for Micro Electro Mechanical Systems. In other words, MEMS are microscopic integrated devices made up of electronics, electrical, and mechanical components that work together to fulfill a single functional requirement, thanks to a technology known as Microsystems Technology (MST). The sensor module is made up of MEMS sensors that range in size from 1 to 100 micrometers.

Figure 6. MEMS Sensor

F. Heat Beat Sensor

The Heart Beat Sensor is a basic gadget that can be utilized to examine the heart's capacity. The blood move through the ear flap is observed by this sensor. The measure of blood in the rear projection changes after some time as the heart drives blood into the veins in the ear flap. A light projection (little brilliant light) is shone through the ear by the sensor, which decides the measure of light that is communicated. The clasp can likewise be utilized on the organization of skin between the thumb and record finger or on a fingertip. In the box, the signal is amplified, reversed, and filtered. The heart rate can be measured by graphing this signal, and some specifics of the heart's pumping operation can be seen on the graph.

G. Buzzer

A buzzer, also known as a beeper, is an electronic signalling system that is commonly used in cars, kitchen appliances such as microwave ovens, and game shows. Originally, this device used an electromechanical mechanism that was similar to an electric bell but didn't have the metal gong (which makes the ringing noise). Many major industries use piezo buzzers as a means of audible detection or warning. This product family ranges from ultra-compact 4 mm SMT buzzers to bigger, high-decibel versions.
H. LCD Module (2x16 character)

Matrix with dots The parameters and fault state are shown using LCD modules. A 16-character, two-line display is employed. It has a controller that connects the data to the LCD panel. The materials used in liquid crystal displays (LCDs) combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range in which the molecules are just as mobile as they would be in a liquid, but are clustered together in an ordered structure akin to that of a crystal. A liquid crystal display (LCD) is made up of two glass panels with liquid crystal content sandwiched between them. Straightforward anodes are covered on the internal surface of the glass plates, characterizing the character, images, or examples to be appeared. To keep a given direction, polymeric layers are available between the terminals and the fluid precious stone atoms.

Application of IoT

An Internet of Things (IoT) network is one in which products are associated with the Internet by means of radio recurrence ID (RFID), infrared sensor, worldwide situating framework (GPS), laser scanner, and other data detecting gadgets as per concurred conventions for data sharing and correspondence, bringing about wise distinguishing proof, area, checking, regulating, and the executives. Through the use of RFID technology and the Internet, products in this network can communicate with one another without the need for human intervention.

4. Result

The Temperature, Humidity and gas esteems are shown in figure 7 is the sequential monitor. We are controlling the signal with switch gadgets made in the cloud stage. At the point when the light isn't distinguished in the coal mineshaft then the yellow catch addresses the shortfall of light in the coal mineshaft. In the event that any questionable conditions happen, warning is shipped off the mail of the approved individual.

![Figure 7. Output Results](image)

5. Future Scope

With the developing developments future work of this experimentation may incorporate, greater improvement of the framework by utilizing other progressed sensors for checking the underground. Dangers. Likewise, every one of the underground tasks can be completed from the beginning. New creating correspondence advancements can be utilized for fast information move in mix with keen sensors for detecting the mine conditions. Additionally, more IOT empowered frameworks can be created for further developed uses.

6. Conclusion

Coal mine security framework is actualized utilizing Gas sensor, Temperature sensor, Vibration sensor, and MEMS sensor to expand the wellbeing of the coal mineshaft representatives and to guard
them. The use of IoT in this device allows for continuous monitoring of the coalmine and alerting of the workers. The device is both reliable and cost-effective.

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